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INFANTRY BATTLE TACTICS.*

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SECOND CAVALRY.

THE formations to be given to the infantry as it arrives on the field of battle, and the various combinations of which these original formations are susceptible, are subjects well worthy of serious consideration.

Under the head of *battle tactics* are properly embraced all those movements, from the massing of the troops as they pass from the line of march to the selected field, and the sending forward of the first line of skirmishers, to the necessary strengthening of this line until it be sufficiently strong to grasp victory from the enemy. The cavalry, artillery and infantry must each play their proper rôle, but we will concern ourselves with the two arms first mentioned only so far as their action directly dictates the formation to be given to the foot troops, either to co-operate with, or to oppose those arms.

The division is, properly speaking, the grand infantry unit of combat, as the corps includes the other arms. Beginning, therefore, with the division, we will try to evolve principles suffi-

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ciently general in their scope to govern the action of all its parts.

If the army be acting on the offensive, the cavalry, with its accompanying artillery, will endeavor to seize and hold the ground most favorable for the operations of the infantry ; acting either on the offensive or defensive, they will endeavor to force the enemy to deploy, to reveal his intentions, and to delay his approach and concentration until the infantry be in position to enact its part.

Composition of a division of infantry. In general terms we will assume a division of infantry to consist of two brigades of two regiments each, a regiment being composed of three battalions of four companies each. The companies we will suppose 200 strong. Our division will thus furnish 9600 bayonets. Each battalion will be commanded by a lieutenant-colonel, and to each company we will assign one captain and four lieutenants.

It is true this organization differs from the one we now have, which has become obsolete among the great military powers ; but it is believed the near future will see a step in advance made in this branch of our military affairs.

To serve our present purpose it is not necessary to go further into the details of this organization. The advocates of the established order always criticise adversely a proposition for a change, but the change comes, as it will sooner or later in this case. I will observe, however, that the tactics here proposed may, with a few changes, be applied to our present regimental and company organizations on their war footing.

Now, if the division be considered the grand unit of combat, it should be complete in all its parts and capable of sustaining the action along the interval assigned it on the line of battle ; that is, beginning with the skirmishers necessary to fill this interval, it should furnish all the succeeding lines, including the final reserves.

This method contemplates that the fighting line of each company be fed successively from the rear by men belonging to the same company, battalion, regiment, brigade or division. Thus the chances of disastrous misunderstanding between commanders of different organizations on the same line are greatly reduced ; each chief is in accord with the officers who support him, the relative rank of each being known, and the men being acquainted



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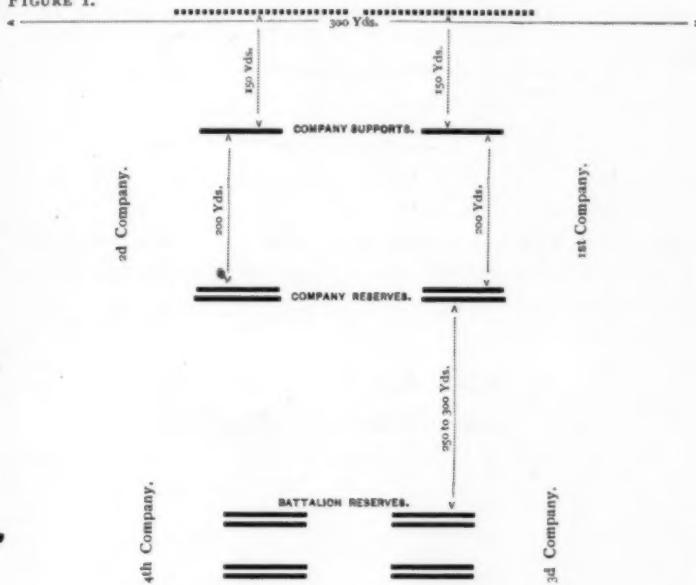
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Under the head of *fighting line* we will include all those parts of the different organizations which are to participate in the earlier stages of the action; thus, in the normal order of the battalion, *two companies* in the formation of skirmishers, supports and reserves constitute the *fighting line*. The other two companies form the battalion reserve. (See figure 1.)

FIGURE 1.



In the regiment two battalions, in their normal order, as just described, constitute the fighting line, while the third battalion forms the regimental reserve. (See figure 2 on next page.)

The brigade and division may be similarly divided.

That part of the fighting line supposed to be actually engaged we will term the *firing line*.

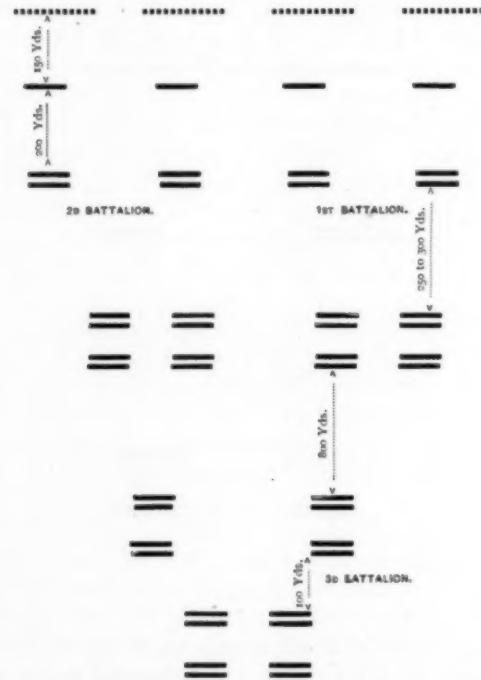
THE DIVISION.

The requirements of the modern action, as regards infantry, demand that the following conditions be observed: In the beginning the *firing line* should be composed of a few skirmishers, selected from the best shots belonging to the companies on the fighting line; close behind these, to give ready

aid, follow the company supports and the company and battalion reserves (figure 3); then the battalions acting as regimental reserves; and, as the reserves in front reinforce the preceding lines, these battalions move forward and take their places. All these participate in the earlier stages of the battle, and constitute the first line.

The losses necessarily sustained by the first line, together with the confusion incident to battle, makes a second line a

FIGURE 2.



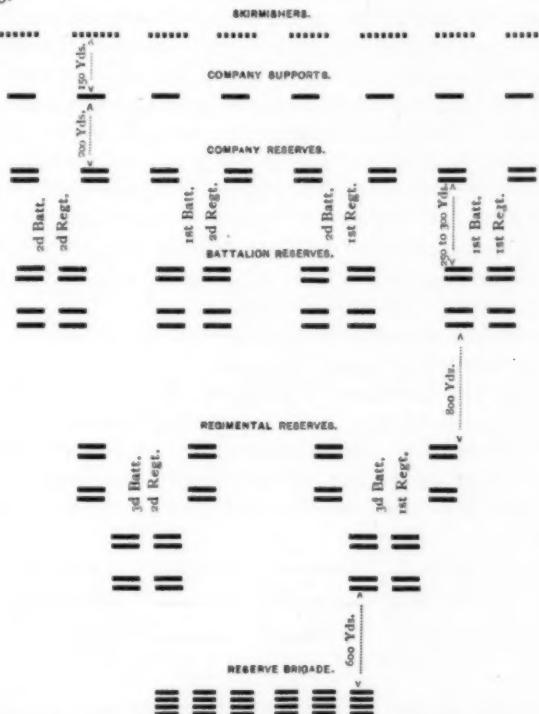
necessity. This line constitutes the division reserve, and is used either to extend the first, to make or meet a flank attack, to arrest retreat, or, to push an advantage gained. Moreover, its presence alone gives confidence to the men on the fighting line. "They also serve who only stand and wait."

On account of its distance from the firing line and the corresponding opportunity to seek shelter from the fire of the enemy's artillery, the division reserve should retain a well-ordered forma-

tion. Its orderly appearance, when called to the front, will inspire confidence and enthusiasm among those troops who have been hotly engaged, and thus largely contribute to success. Hence we divide the division in two lines; the first, or fighting line; and the second, or reserve.

The first line may be composed of one brigade, while the

FIGURE 3.



other brigade constitutes the reserve; or, each brigade may place one regiment in the first, and one in the second line.

In the first case each regiment of the leading brigade will place two battalions on the fighting line and hold the third in reserve. The rear brigade forms the division reserve, and will be posted about six hundred yards in rear of the regimental reserves. Figure 3 shows this formation.

This disposition will be preferable if the division be approaching the field of battle marching in a single column. Moreover,

it gives the general of a division a homogeneous reserve consisting of an entire brigade.

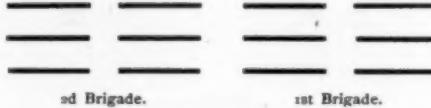
The interval occupied by the firing line (figure 3), composed of the front rank of one platoon taken from each of the eight companies represented on this line, is from 1200 to 1500 yards, or, in particular cases 1800 yards. The depth of the formation is about 2000 yards, as follows: From the firing line to the company supports, 150 yards; from the company supports to the company reserves, 200 yards; from the latter to the battalion reserves, 250 to 300 yards; from the battalion to the regimental reserves, 800 yards; and from the latter to the division reserves, 600 yards. When the two battalions composing the regimental reserves are posted in "battle order," as represented in the figure, 100 yards must be added for the depth of this formation.

In the second case, the first line will be composed of four battalions belonging to the two leading regiments, with two battalions as regimental reserves. Each brigade furnishes a regiment to form a division reserve.

This formation can be quickly taken if the division be marching in two columns, a brigade in each.

Supposing a succession of powerful efforts to be imperative, the two dispositions just cited may be supplemented by a third. In this instance the division will be deployed in one line, each regiment being in column of battalions. (See figure 4.) The flanks of the division should be protected by other troops.

FIGURE 4.



2d Brigade.

1st Brigade.

The employment of this formation will be justifiable only when it becomes absolutely necessary to succeed to make a lodgment on some point of the enemy's line, irrespective of the large losses to be sustained. The advance should be preceded by a heavy artillery fire, to shake the enemy. It will usually be best for the leading battalions to advance in several lines, the supports and reserves moving on the firing line as it closes with the enemy.

It is true, battles do not admit of the application of invariable rules, but the foregoing dispositions are of a general nature, and

thus are well calculated to meet the ordinary emergencies of battle. These formations are also susceptible of rapid changes and combinations, and enable the general to readily alter his plans to conform to any peculiar character of the ground or action.

The commands of the division commander should be communicated through staff officers; while of necessity general in their nature, they should, nevertheless, be couched as far as possible in tactical language, and embrace the particular formation desired for each brigade, or instructions for the brigade commander to be governed by special circumstances; the direction the line is to extend; the point where its right or left is to rest; with what troops to connect, and such further instructions as may be necessary to carry out his views. To avoid mistakes in transmitting orders, the names of the brigade commanders should be mentioned.

GENERAL RULES GOVERNING THE RESERVE.

Before passing to the next aggressive step—that is, to the dispositions necessary to fight the brigade—we will set forth a few principles which should govern reserves in general, and the division reserve in particular.

A reserve need not necessarily be posted in rear of the line to be supported; frequently it may be advantageous to form it in echelon with that line. The latter method will be particularly useful if the division be operating on the flank of the army, for it then serves either to threaten or to turn the enemy's flank, as well as to protect that of the general line, which is always a weak point. This formation may also be used to occupy the enemy's attention, while preparations for the real attack are being made elsewhere.

Officers in command of reserves must, while seeking cover, choose such formations as will least interfere with the movements of the cavalry and artillery.

Artillery is used in masses, and accompanies modern armies in about the proportion of one field gun to a thousand bayonets; space must be allowed for its employment accordingly.

The second line, under the direct control of the division commander, will be held under cover, and at a distance from the first, varying with the character of the action and the nature of the ground, until the necessity for its presence on the fighting

line becomes urgent; even then the employment of the entire reserve will be permissible only in the last extremity. When employed, it should be used vigorously and at decisive points. For, as stated by a distinguished author, the application of superior force at a decisive point is the vital principle of all warfare.

The reserve moves forward and occupies the positions formerly held by the first line, as the latter forces the enemy back. It need not necessarily be united; the battalions composing it may be posted in rear of different parts of the first line. Its commander should select from time to time strong positions in which to deploy his troops to contest the advance of the enemy, and to enable the first line to reform if driven back.

The officers of the reserve should be constantly on the alert to prevent any panic arising among the troops of the first line spreading to their own.

THE BRIGADE.

As stated above, our brigade is supposed to consist of two regiments of three battalions each, each battalion containing four companies.

In the brigade, the formation to be taken depends much on the nature of the ground and whether the brigade be acting alone or with other troops.

If formed in one line, four battalions should habitually constitute the front of the brigade, while the third battalion of each regiment will be held in reserve. (See the first brigade in Fig. 3.) The front covered may, as before stated, vary from twelve hundred to fifteen hundred yards, or, in particular cases, to eighteen hundred yards.

In two lines the leading regiment places two battalions on the fighting line and the third in reserve. The rear regiment, as a second line, is posted about six hundred yards in rear of the reserve battalion of the leading regiment, and will be given some convenient formation, such as in line of masses.

If the brigade be approaching the field of battle marching in a single column, the three battalions of the leading regiment may be placed on the fighting line, and a reserve battalion taken from the rear regiment, with the remaining two posted as a second line.

This formation, however, speedily disintegrates the second

regiment, and is objectionable except when the brigade is acting alone, and then only when a rapid extension of front is of the first importance.

For a succession of powerful attacks the regiments may be formed side by side in column of battalions. (Figure 4 shows each brigade in this formation.) Circumstances dictate the distances between battalions, and the usual intervals between regiments may likewise require extension or contraction. The colonels should avoid calling on their second and third battalions prematurely; the latter might be held until ordered into action by the general.

Neither the general of division nor brigade should have a fixed position, but should be careful to indicate where reports will be received.

The general may direct when the troops on the first line shall pass from close to open order, or this may be left to the discretion of the regimental and battalion commanders.

If compelled to give an order to a battalion commander, the general should immediately communicate this fact to the colonel.

There should be simple and familiar orders, enabling the brigade commander to move the line to the front, to the rear, by the flank, halt it, and cause it to change front. If a battalion be forced out of its position in the general line in the execution of any of these movements, its chief should cause it to regain its proper place as quickly as possible.

THE REGIMENT.

We will first consider a regiment operating with other troops, and afterward prescribe such rules as are especially applicable if it be acting alone.

The regiment will usually be formed in two lines, as shown in figure 2. Two battalions, in their normal formation for skirmishing, constitute the fighting line, while the third forms the regimental reserve.

The front covered by the first line varies from six hundred to nine hundred yards.

The reserve battalion should be posted about eight hundred yards in rear of the first line. This distance may vary with the nature of the ground; if the country be broken, or if there be villages affording shelter, it may be considerably decreased. To protect it from the fire of the enemy's artillery, the battalion

may be given various formations, in order to profit by any cover at hand.

The position of the colonel should be near the centre of the line occupied by the battalion reserves. If called elsewhere he takes the necessary precautions to indicate his whereabouts, and returns to his proper place as soon as practicable.

Acting under general instructions from the regimental commander, the reserve battalion reinforces the first line as circumstances require. Its mere appearance on the fighting line should be the signal for a determined offensive movement. It should not be ordered forward until the decisive moment, and then, if possible, it should be replaced by a battalion of the regiment in rear belonging to the same brigade or division. Its commander avoids separating unnecessarily the companies composing it, and selects from time to time favorable positions in which to deploy his battalion in order to contest the advance of the enemy, if the first line be driven back. In such an event the officers of the first and second battalions should avail themselves of the line so established by the reserve to reform their troops on its flanks, or in its rear.

The regiment will generally arrive on the field in column of march, and, if a delay occur awaiting the result of the action of the advance guard of the army, it will perhaps be convenient to form it in column of masses in rear of the position it is to occupy, avoiding unnecessary interference with the passage and movements of the other arms.

If the cavalry and artillery have reconnoitred the ground in advance, the commanders of these arms point out the most favorable positions to colonels and lieutenant-colonels of infantry as they arrive.

The regimental and battalion commanders should be familiar with the general principles upon which the cavalry and artillery arms are manœuvred and fought; thus they will be able to give intelligent co-operation, and to utilize fully the assistance rendered by those arms, and also better understand how to oppose them.

By first overcoming the enemy's artillery, and then concentrating its fire on the point of attack, the artillery prepares the way for the advance of the infantry, and at the moment of assault it directs its attention to the reserves of the enemy.

Colonels and lieutenant-colonels should be able to judge of

the effect of artillery fire, and know the distances at which the different varieties become effective.

If the enemy be beaten, cavalry will be especially useful in charging his broken troops to prevent their rallying and reforming their lines.

In defeat, the artillery, aided by the cavalry, strive to check the advance of the enemy, in order to enable the infantry to withdraw and reform.

If the regiment be acting on the flank of the general line, it may, either to menace or to turn the adversary's flank, advance to its position with the two battalions on the fighting line in echelon, and the third battalion in rear of the outer flank. In this way the regimental reserve not only threatens the flank of the enemy, but protects that of the general line. If there be no cavalry available, skirmishers or small parties should be thrown out to the flank and rear of the third battalion as a precaution against a surprise from those directions. This will be particularly desirable when skirting the edge of woods. Communication between the regimental and battalion commanders may be kept up by similar means, if more convenient ones do not exist.

THE REGIMENT AS AN ADVANCE GUARD.

If the regiment be the advance guard of a larger body of troops entering battle, one battalion may constitute the first and two the second line, thus enabling the colonel to hold his command well in hand.

It has been stated that, in the normal order of the battalion, two companies in the formation of skirmishers, supports and reserves form the fighting line, while the battalion reserve is composed of the other two companies; but when the regiment is acting as an advance guard, the leading battalion may place all its companies on the fighting line, and cover twice its usual front; this, in order to force the enemy to deploy his troops and reveal his position, as well as to thoroughly reconnoitre the ground and to prevent being outflanked. The second and third battalions follow in rear of the flanks of the first line, at a distance varying with the nature of the ground, but usually about six hundred yards.

This formation should be temporary.

The colonel must endeavor to determine the direction of the enemy's line, to avoid having his own assailed in flank. If, on

the contrary, the flank of the adversary be struck, the reserve battalions must push the advantage with all vigor, either by extending or directly reinforcing the first line.

If the enemy be found in front, as soon as he is developed in force, the second and third battalions deploy two companies, each in three lines, as skirmishers, supports and reserves, and hold the other two companies as battalion reserves, and then move upon the position which has been selected. The first battalion will be withdrawn *after* the others are in *position*. The regiment will then be in the formation shown in figure 2.

If passing a defile, the advance of the regiment should be covered by skirmishers taken from the first battalion, with the supports and reserves following closely. The second and third battalions are kept near, and on emerging take position in rear of the flanks of the first. To prevent the enemy passing between the flanks of the line and the entrance of the defile, the colonel may deploy all three battalions.

THE REGIMENT ACTING AS A REAR GUARD.

In this capacity the duties of the regiment are essentially defensive. Two battalions may be placed on the fighting line and the third held in reserve; or, as in an advance guard, this line may be composed of the four companies of one battalion, while the other battalions are in reserve. In making these dispositions the colonel must be governed by circumstances, principally by the energy of the pursuit. In order that the main body of the troops may gain time, the rear guard should struggle to hold the enemy at a distance; force him to deploy, and in every manner endeavor to retard his advance; and, if the conditions be favorable, it may temporarily assume the offensive.

Remembering that the ultimate purpose is to enable the main body to retire in good order, the colonel should avoid, if possible, so compromising his command as to require assistance. To prevent being cut off, he must not separate himself too far from the other troops, but if the corps in retreat be passing through a defile he should not hesitate to sacrifice his command if necessary to insure the safety of the main body. When the defile has been passed he should seek a favorable position to prevent the enemy from debouching, and if any have already debouched he will endeavor to throw them back in confusion on those still in the defile.

In passing a defile to the rear, the troops farthest from the entrance should begin the movement. Each battalion moves by the flank nearest the defile and withdraws under cover of its skirmishers, who follow as soon as practicable. On emerging, the colonel reforms his line on ground *previously* selected and indicated to the battalion commanders.

In passing a defile either to the front or rear, artillery, if possible, should be posted so as to bring a converging fire on the enemy's approach, thus enabling the infantry to form or withdraw under its cover.

THE REGIMENT ACTING ALONE.

If a regiment be acting alone the presence of a reserve is of the first importance, and the colonel must avoid calling on it prematurely; its duties are to reinforce the fighting line, to protect the flanks, to check the enemy if the first line be driven back, and finally, in case of defeat, to secure the line of retreat. Its position should be selected with great care, and should be distant from the fighting line about six hundred yards.

The force and composition of the enemy, the object to be attained, and the nature of the ground will determine the formation which the regiment should assume.

If acting on the offensive, the preliminary reconnaissance should be made as complete and carried as far as possible. Then one company from each of the two leading battalions will generally be sent forward in open order to develop the enemy, and as the resistance increases these companies will be reinforced by two more, giving the fighting line its usual strength. The latter companies will extend the first line, and, if possible, make a flank attack.

While dash always carries certain elements of success, the colonel should here remember his regiment is acting alone, and to engage all, or even the greater part of it, with an enemy whose strength has not been developed, may involve him with a force so superior in numbers as to make it impossible to extricate his command. This remark applies, of course, to commands either larger or smaller than the regiment.

If the regiment be on the defensive, the fighting line should be made strong from the first, each of the leading battalions deploying at least two companies.

PASSAGE OF LINES.

To relieve a regiment actively engaged on the firing line is a difficult and dangerous movement, justifiable only in an emergency.

If the movement be determined upon, the leading battalions (the first and second as shown in figure 2) approach the first line with their leading companies deployed as skirmishers, supports and reserves; or, should the character of the action require it, the skirmishers may be strengthened by the last-mentioned lines.

The skirmishers of each company of the new line relieve the skirmishers in their front. The company supports and reserves relieve the corresponding detachments in their front, and at the same time the battalion and regimental reserves of the new line move forward and halt near those of the old line. When the new regiment is in position, and not before, the other may be withdrawn.

THE BATTALION.

The employment of a battalion in action will be much the same whether the regiment be operating alone or with other regiments. We will assume the presence of the entire division.

Each battalion should have its proper refrain, to be sounded before the different trumpet calls, and whistle signals should be understood and used on the firing line as circumstances require.

Attention is invited to figure 3, showing the division preparing for battle in two lines, a brigade in each; to figure 2, showing the regiment with two battalions on the fighting line, and the third in reserve, and to figure 1, representing the battalion in its normal order for battle.

In the right half of the latter figure (1) the first, or firing line, is composed of the front rank men of either platoon, say the first; the company being divided into two platoons. It is commanded by a lieutenant assisted by six non-commissioned officers. The rear rank of the same platoon constitutes the second line, or support, and is likewise commanded by a lieutenant and accompanied by six non-commissioned officers. The second platoon with two lieutenants and thirteen non-commissioned officers forms the company reserve. The distances between the lines are shown in the drawing. The captain holds himself a few yards in front of the support. The usual interval between skirmishers will be two and one-half yards, and they cover an interval equal to twice the front of the company in double rank. The

skirmishers of a battalion will, in consequence, cover a space equal to its front in double rank, to be increased by one-half the usual interval (twenty-four yards) between its flanks and those of the adjacent battalions.

For a battalion of eight hundred men the front in close order, with the usual interval between battalions added, will be about 300 yards. This assumes the width of a man to be two feet, which gives greater freedom in marching than the twenty-two inches taken in our present tactics. In open order the front of a battalion may vary from 300 to 450 yards.

On the offensive. At from two thousand to twenty-five hundred yards from the enemy's artillery, this distance depending on the character of the ground, the two companies which are to take the advance are thrown forward one hundred yards, and each formed, if the ground be favorable, in column of platoons, with an interval between companies of once and a half company front in double rank. The third and fourth companies, which are to form the battalion reserve, move by the shortest line to a point one hundred yards in rear of the centre of the first line; they also are placed in column of platoons with an interval of platoon front between them. (For this formation see the 3d battalion in figure 2.)

This formation of the battalion we will call *battle order*, and is well calculated to throw a skirmish line quickly either to the front or flank. The battalion reserve will be under the immediate command of the second field officer, with the rank of major.

The battalion in "battle order," advances until within about fifteen hundred yards of the enemy's skirmishers, when the lieutenant-colonel orders the advance companies to deploy in three lines, as skirmishers, support and reserve. In a very *open* country the support may remain with the reserve until the firing line has closed to about one thousand yards from the enemy.

In deploying the front rank of the leading platoon as skirmishers, the centre man will habitually move straight to the front, while the other men lengthen the step and oblique to the right or left, according to their position, and having gained the prescribed interval move straight to the front.

The battalion commander strives to shake the *morale* of the enemy by securing at every stage of the advance a preponderating fire, for a concentration of fire, like numbers, at the decisive points means success; at the same time advancing in such

small fractions, up to the final rush or assault, as to reduce the casualties to the lowest limit.

The battalion commander takes position between the reserves of the companies on the fighting line. (See figure 1.)

The leading companies advance by short rushes, the officers and non-commissioned officers, including the corporals in ranks, pressing the line forward. Acting under general instructions from their respective captains, the chiefs of the firing line advance their entire line, the right or left skirmishers, or they may send the line forward man by man.

These chiefs select positions from which fire can be opened to the greatest advantage, and with the least exposure, and before each advance indicate whether the men are to move cautiously or on a run.

When firing from behind a crest, the position should be such as to enable the skirmishers to overlook the slope toward the enemy.

The men take advantage of every convenient cover, and should be instructed how to make loop-holes in walls and houses. When firing from woods, they should try to place themselves behind the first trees. Brush and standing grain afford concealment, but little other protection, and when firing from these the skirmishers should change their positions frequently.

To prevent a waste of ammunition is one of the most important duties of officers and non-commissioned officers. Except at artillery or masses of troops, when the firing is preferably by volley, only the best marksmen will be permitted to fire at eight hundred yards from the enemy's skirmish line. To more directly control the expenditure of ammunition, certain men may be designated by name and told how many cartridges to fire, or the firing may be by numbers. The officers should, from time to time, indicate the distance. As the line darts forward, from cover to cover, the chiefs authorize other skirmishers, according to their proficiency in marksmanship, to open fire; striving at all times to prevent a waste of ammunition; they should also guard against delay in opening a fire that may be effective.

Captains should be encouraged in employing all the resources of their companies in the most efficacious manner, being careful to avoid calling upon their supports and reserves prematurely. The open order now necessary in battle, requires that captains on the firing line be given great freedom of action.

The two reserve companies conform to the movements of the reserves of the companies on the fighting line; gradually diminish their distance from them, and finally replace them as the latter move on the firing line. The two companies may be held intact, or, in the discretion of the lieutenant-colonel, they may be deployed in several lines or echelons.

In the distances mentioned at which fire should be opened we have in mind the Springfield rifle, cal. 0.45, and a little less than the accuracy obtained by our troops in target practice.

At about five hundred yards from the enemy's skirmishers all the men on the skirmish line should be firing, and as the enemy's fire at this distance will also increase in severity, the firing line should pass from cover to cover by short rushes, seldom greater than fifty yards.

At 450 to 500 yards from the enemy the firing line will usually be reinforced by the support, which advances by short rushes, availing itself at each halt of any cover at hand.

We now have on the firing line one-half of the strength, minus the losses, of each of the two advance companies. The line so constituted continues to advance by short rushes, and not until it becomes impossible to make any further progress will the remaining half of these companies be ordered into action. Under general instructions from the lieutenant-colonel, each captain may send his reserve forward as one line, or it may be divided and sent forward as a *first* and *second* reserve.

The support and reserve may reinforce the firing line in either close or open order. The former formation will secure a greater intensity of fire. They do not necessarily reinforce the firing line from the rear; it may be advisable to extend that line. The reserve may also be divided, and one-half reinforce the right and the other half the left skirmishers.

At three hundred yards from the enemy (this distance varying with the nature of the ground) it will probably become necessary for the reserve to join the firing line. With this the skirmishers will nearly have attained the strength of a line in single rank at close order. It is probable the rushes cannot now be made for a greater distance than twenty-five yards. If necessary one half of the line, say the right, may move forward while the left half by its fire holds the enemy in check; the rear skirmishers are brought forward as soon as the first half has opened fire. In this way the line is advanced to within two hundred yards of the

enemy. Rapid fire has commenced, over which the officers and non-commissioned officers can exercise little control other than to restrain the men from shooting high.

In all these advances the firing line has been encouraged to move from one position to another by timely reinforcements by the support and reserves, until all the men of the leading companies are engaged. If the enemy still resists the battalion reserve will be called on, and, if practicable, a covered position sought for these troops so near the firing line that a short rush will carry them to it.

The rapid fire by the advance companies is continued and directed to the best advantage, and when its effect begins to tell upon the enemy the lieutenant-colonel orders forward one company of the battalion reserve, in close order and with bayonets fixed; this company having reached the line, the lieutenant-colonel commands, *Charge*; the trumpeters sound the charge, the officers and men cheer and rush upon the enemy's position, the men of the firing line fixing bayonets as they advance. If armed with repeating rifles, the magazine will be reserved for this rush.

If the assault fails, the firing line, now composed of three companies, by its rapid fire and any hastily constructed cover holds the ground gained, while the fourth company is quickly brought forward and the charge executed again as before.

If he deems it necessary the battalion commander may order the fourth company into action at the same time the third goes forward, but it must not be ordered into action unless its presence be necessary to success. Otherwise it will be held in rear, either to repulse a counter attack, especially one on the flank, or to serve as a rallying point for the advance companies should they be driven back. When ordered to the firing line it should be replaced by a company of the battalion in rear belonging to the same regiment.

Even in case of success it will be necessary to guard against a counter attack, and to this end two companies will pursue the enemy only until a favorable position be reached from which to open fire, while the other companies rally and in close order again move forward to the firing line. If all four companies have participated in the assault, it would be well for the third and fourth to continue the pursuit, while the first and second rally as just stated.

If the enemy retires in confusion, cavalry may charge to great advantage.

If the attack fails, or the position be lost by a counter attack, the battalion of the second line, already prepared, deploys and gives the retiring line time to rally and reform in its rear. Circumstances must dictate whether the reserve battalion, now in front, renews the attack or remains on the defensive.

It will be observed that in the earlier stages of the action the attacking force is so disposed as to expose to the enemy's fire only so many men as are capable of inflicting loss upon him, while the remainder benefit as much as possible by cover. It is also apparent that the intention is to first break down the more serious resistance on the part of the enemy by fire, and then to assault his position with numbers.

To permit each skirmisher to use his rifle with the greatest effect at long distance firing, say from 500 to 800 yards, intervals of at least two and a-half yards should be allowed.

If an advantage be gained by the firing line, it should be promptly pushed by the support and reserves, if possible, before the enemy can either rally or reinforce his line. Again, the character of the action may be such that the battalion will be overwhelmed by the enemy's fire before it closes sufficiently near to make the final rush; if this be so, the third battalion should move promptly to its relief, and at the same time one from the division reserve will be brought forward and posted as a regimental reserve.

ON THE DEFENSIVE.

Except that the distances between echelons may be diminished and the firing line made stronger at the commencement, the normal formation of the battalion will be the same as on the offensive; the skirmishers commencing the action.

The safety of the defense lies in a well-directed fire, which should be applied to prevent the enemy from reaching a close position. Each successive advance will be met with an increased fire, and the energy of the attack broken before the enemy closes near enough to assault; hence the reserve companies join the firing line before the enemy prepares for the final attack.

Ammunition can be supplied more easily than when acting on the offensive, and consequently fire may be opened at a greater range.

If practicable, a strong position will be selected and strengthened by artificial defense before the enemy arrives.

Acting either on the offensive or defensive no opportunity should be lost to strike an exposed flank. Ammunition will be supplied the firing line, and wounded men taken to the rear by men of a special corps; those of the fighting line should not be sent back for either purpose.

Armed with the breech-loader, a skirmish line should resist cavalry, if fire can be brought to bear at good range; if it cannot, then the men should rally in small groups and the supports and reserves in circles. The most convenient group will be that of the unit of manœuvre, as our "set of four," or the squads of different strength in the various armies.

The battalion commander will avoid a passive defense by taking the offensive whenever practicable; a favorable moment will be just as the enemy moves forward to his final assault. At that moment a company of the reserve may with advantage be directed against the flank of the enemy, while the line in his front rapidly increases its fire. In a like manner a flank attack may be met by a reserve company.

Should the first battalion meet with disaster and be forced to give way, a battalion of the second line deploys, and, as soon as the first has passed to its rear, it endeavors to take the offensive and regain the lost position.

To meet an emergency, positions to the rear should be selected in advance, and if compelled to retreat the defense will withdraw by echelons, resisting as much as possible to enable the main body of troops to take the formation in "column of march." A rout may be avoided by posting the best troops as rear and flank guards, and having these act in conjunction with the accompanying cavalry and artillery.*

For discussion on this paper see "Comment and Criticism."

REFORM IN ARMY ADMINISTRATION.

By BREVET LIEUT.-COL. J. G. C. LEE, U. S. A.

QUARTERMASTER'S DEPARTMENT.

THE Army as it stands organized to-day is the result of long experience. From its creation to the present time, legislation, stimulated by necessity, and the knowledge gained by officers in active service, has sought to bring it to the very highest state of perfection. The theory of the Government and the spirit of our institutions declare the absence of necessity for a large standing army, but demand that there shall be a thoroughly organized nucleus around which the volunteer forces of the country may rally in case of war, and to which they may look for prompt and vigorous instruction. Hence ample provision is made that the means of raising, equipping, arming, drilling, supplying and transporting large bodies of men shall be always ready and at hand. Actuated by these views, the country maintains our small land force, with what would otherwise be a somewhat disproportionate number of staff officers.

If any vital principle be especially applicable to such an army as ours, it is that its instruction in time of peace should be its best preparation for war. Not only should the system of its management be clear, comprehensive and vigorous, but the system should be capable of expanding to meet the necessities of the largest forces, and of being easily understood by the ordinarily intelligent man from civil life. In the late Civil War, the Army of the United States grew from a few thousands to several millions of men, yet the capacity of each and every branch of administration was found equal to the strain thus laid upon it. And when the War was over and the millions again dwindled to the thousands, the various departments contracted, proportionately without friction, jar or confusion. There must certainly have been great merit in an army organization that exhibited such extraordinary powers, and such admirable capacities for the peculiar needs of the country.

But the Army of to-day has drifted in some measure away

from the simplicity and vigor of the system that then characterized it. Slowly and at intervals so as to be scarcely noticeable, innovations and encroachments have been made, from one cause or another, by this and that agent, to correct some real or fancied abuse or irregularity, that have largely complicated the machinery of administration and seriously encroached on the simplicity, the effectiveness and even the vigor and vitality of the Service.

I am not unmindful that advancement in any direction means change in the order of things, and that the rules that govern at one period are not, in the nature of things, wholly applicable to any succeeding period. With the many inventions and the great progress in the arts and sciences, made day by day, changes must of necessity ensue. But what I urge, is, that *our* system should *always* be kept simple, comprehensive, clear, vigorous and effective, instead of in any respect cumbrous, intricate, diffuse, weak, and lacking in efficiency.

Some of the later requirements, in the way of reports, have grown out of single instances of deception practised by one dishonest agent. I have in mind, one paper to which I shall refer later on, required weekly and monthly of all disbursing officers, just because a great defalcation had been skillfully and successfully carried out by a most plausible officer of good address, whom everybody trusted. And so, an additional regulation was made and has now been many years in use, involving a great aggregation of time and labor, because of a past crime not likely to happen often, yet without, so far as I know, a single detection of a like crime, and which a subsequent defalcation proved, could be as successfully manipulated as any other part of his crime.

To the reformation of all administration, wherever such can be made, in the interest of simplicity and effectiveness, the to-day student of army affairs should apply himself as a self-appointed task.

It should not appear in any degree singular that army laws and rules should require revision, and rearrangement from time to time. There is scarcely a commonwealth of the Union that has not, now and then, found it necessary to collate and codify its laws, and even to amend its very constitution.

By reformation I do not mean an entire abandonment of all existing order and regulation. By no means. On the contrary, what is good, what experience has proven to be of value, should

never be lost sight of, but should be held to with a grasp of steel. It is the *unnecessary*, the *extraneous*, the *non-essential*, that I strike at.

It must not be forgotten that the existing state of things has been a matter of slow growth, is the accumulation of vast experience, has a strong hold, and is in very many respects most sound and excellent. Wherein it is faulty, it is, for the very reason of its age, like a chronic disease, and presents great obstinacy to treatment. And so, one cannot help feeling deeply impressed with the gravity of the step, when he assails it in any respect. Indeed, I desire to be plainly understood, as not aiming a blow at the whole structure, but at the errors and imperfections which sap the vitality of the body—as a physician would remove any abnormal growth which, if left untouched, would, in time, steal away the life of the patient. And I further wish to be understood as approaching the subject with the most profound respect for what past experience has given us and laid down for our guidance. He would be a blunderer indeed who should attempt to ignore the teachings of the past, in any direction.

For the government of the Army, there are: 1st, the laws of the land; 2d, the Army Regulations and decisions; 3d, orders.

The laws of Congress reach everywhere, and apply to all.

The Army Regulations, with decisions thereunder, reach the Army, but do not always apply alike, though such is their evident purpose.

Orders may be said to apply unequally, inasmuch as they are from many sources, of varied views and dissimilar conceptions.

In different geographical departments different practices obtain, different orders of things govern. The methods are not uniform.

Certain powers are delegated to certain officers, whether of command or administration. They are not the same in different places. One officer may do a thing in one position that another officer in a like position will not be allowed to do. Hence it is that officers do not tread their ways wholly confidently, that uncertainty and indecision arise in cases when certainty and promptitude are of utmost importance, that we all "feel" our ways, more or less, and that we sometimes hesitate to act upon our best judgment through fear that it may be misunderstood or disapproved.

It must be plain, however, that in the main the government

of the Army should be uniform everywhere, that the subordinate may clearly know his duty and what is expected of him. Hence the need of a system that will work alike everywhere, dividing the duties as it spreads outward, yet centring them in one head, from which may spring general control, but leaving detail to be provided for by divisions and subdivisions.

To my mind it is to the office that certain rights belong and not to the man who holds it, apart from such office. The authorities have certainly the right to select their man, but once having selected, they are bound to give him full faith and credit so long as he deserves it, together with all the rights that belong to the office. There should be no "fish of one and flesh of the other" business anywhere.

All observant men must have seen of later years a strong tendency toward the centralization of all the details of control. No thoughtful person would deny the necessity of central general control. All great enterprises of whatever kind or character must have a head, and especially is this so in army matters. But when that control descends to each little detail, it is in imminent danger of being overwhelmed, of letting important questions go without the consideration they merit, while giving time to some trifling matter which a proper division of labor could have most beneficially delegated to a competent subordinate.

I believe there should be a rearrangement, readjustment, reformation throughout, from the top down to the remotest corner, embracing greater simplicity, more vigor, careful definition and far-reaching clearness.

Those who have been even slightly conversant with the affairs of the War Department for the last fifteen or twenty years have been aware that strained relations have on several occasions existed between the Secretary and the general in command of the Army, arising in whole, I judge, from a divergence of conception on the part of each of the duties of the respective offices.

Had the line been clearly drawn, either by Congress or the President, such contentions would likely never have arisen, and the differences between these exalted officers, necessarily more or less hurtful to the Army, have been impossible. It may be said that it is an impossibility to define the boundary of authority and action; that no agreement could be reached, that neither Congress nor the President would be willing to determine the lines. And so matters go on in an indeterminate way, har-

monious in the main, because of mutual respect, rather than from any well-defined boundary of right. Well would it be for the country and the Army if the limit could be defined and the point at which the subordinate could always confidently take up his duty be plainly stated.

No time would seem more propitious for such a step than the present. With a statesman of profound strength, ability, industry and application, himself once a soldier of rank, at the head of the War Department, and a distinguished soldier in command of the Army, who has displayed conspicuous ability in the administration of the office of Secretary of War, there would seem little difficulty in arranging a basis of guidance clearly marking out the lines and boundaries of action that would become a precedent for all time.

Following the same course, all questions as to authority, rights, duties and privileges of command should be first thoroughly analyzed and determined, and then sharply laid down and defined, and this should be done for every command, from the highest to the lowest. It has been done, to some extent, in the last Army Regulations, but the scope may profitably be enlarged and amplified. I do not assume to say how this can *best* be done, but it seems as if by first asking the views of all general officers as to the scope that appears to them warranted for divisions, departments, districts, posts, regiments and detachments, and then of many of the most competent and intelligent of subordinate commanders, and submit these to well-selected boards, the best of results may be reached. In like manner carefully appointed boards may work reform in all branches.

But while the divisions and sub-divisions of command are many and sometimes intricate, each and every one of them is again associated with all the subordinate questions of administration and supply, and here it is that the staff steps in as a most important adjunct and factor. As I have said, experience has effectively taught that the best results come through a division of labor, and the staff of our Army, as now constituted, though under the control and command of the officer it may be with, yet takes from such officer all the detailed care and responsibility of supply, leaving him free to carry out the larger and more important functions of his office, untrammelled by the perplexities and petty annoyances that beset management in detail.

So excellent is our staff organization that the armies of the

old world have largely adopted it, and have, step by step, engrafted portions of it into their military systems.

And yet it is in the staff departments that the greatest need of reformation seems to me to exist to-day.

I know I should call down upon me adverse opinions and strictures, from many sides, did I assume to go into each one with a probe to ferret out its remotest corners of defect and unhealthfulness. No one person has the right—even had he the ability—to do that. Each department must be left to work out its own results. My aim has been to deal with my subject in a general way, to direct attention to it, to make any suggestions that might seem proper, and to touch only on such salient points as must be apparent to all.

For instance, who will stand up and aver that the allowance of rooms, as now prescribed by Army Regulations, is at all commensurate with the present requirements; who maintain that the allowance of baggage on changing station is adequate; who elect to defend our voluminous papers and circuitous methods of purchase and supply; who proclaim that no more simple transportation system may be adopted? Or who will uphold a system whereby the foods supplied shall not always be the most ample as to number, and the freshest and most excellent as to quality? Who would defend impurity of medicines for the sick; or the supply of poor guns and ammunition for the soldier to do battle?

Looking back, we find that many of our regulations and allowances date far into the past, behind the invention of the telegraph, the telephone, the adaptation of electricity to general use, the daguerreotype with all its developments, and many kindred inventions which have in later years revolutionized the conditions of society. Some of these allowances go even behind the general use of railroads and steamboats. They were based on another era of civilization, on limited and costly transportation and the scantily-supplied treasury of a nation struggling into existence and growing into power and influence.

But the railroad and steamboat are now everywhere; transportation is cheap; the country is rich, powerful and prosperous; its place among the nations is assured; the people are well to do; and they no longer need or wish that their servants shall be pinched by the conditions of earlier days. The nation has cast off its swaddling clothes, and stands in its full-grown manhood

and strength, ready to care for its defenders and wards, ready to bear all burdens its necessities demand of the individual.

And yet we are restricted to-day—to allowances of rooms, and of transportation of baggage on change of station that would be ridiculous were they not so oppressive. Imagine a lieutenant, of 15 or 20 years' service (and there are many such), married and with a family well on the way to manhood or womanhood, living in one room for quarters and one for kitchen; or a general officer transporting the household of his rank and station on an allowance of 2000 or 2500 lbs. Where shall we find more absurd or inharmonious conditions?

Happily the regulation in regard to rooms has, by its own absurdity, become a dead letter, and most officers are pretty well provided for, though in open disregard of the existing allowance.

But it is far different in relation to baggage allowance, which, being so greatly inadequate, leaves officers subjected to great and oppressive additional expense whenever called upon to change station, at the beck and call of the Government, sometimes as often as three and four times a year, and very frequently as often as once a year.

The allowance at present is just about one-fourth of what justice demands it should be, and will barely transport clothing and bedding, let alone furniture and housekeeping appointments. Of course, if increased to what it should be, there would be occasional instances where an officer would not need his full allowance, in which case he should be restricted to what he actually owns and takes to his new station. As it now is, the officer has frequently to sell his household property (often gained by stinting economy) at ruinous rates, for the reason that he is unable to pay for the transportation of his family and his baggage at the same time. The allowance is not a matter of law, but of regulation and within the control of the War Department.*

The truth is, many regulations and allowances are determined by officers, not subject to change themselves, and long removed from close contact with the Army and its necessities. In their sometimes mistaken zeal to economize they lose sight of the fact that the nation does not seek to gain by imposing losses upon

* Since writing the foregoing in relation to baggage, the allowance has been somewhat increased, but is still far below an adequate or reasonable amount.

any citizen, and that it is ever ready to treat its servants with liberality as well as exact fairness.

Consider also the allowance of stationery and mineral oils. What will the persons most interested say of them? Will any one pretend to support the theory that a commander of a district or brigade can conduct his official correspondence for a whole quarter on 12 quires of writing paper and 200 envelopes, or of a post of not less than five companies on 10 quires and 150 envelopes, or of three or four companies on 8 quires and 120 envelopes, two companies on 7 quires and 100 envelopes, and one company on 6 quires and 80 envelopes? It is true that extra issues are provided for, but they must be approved by the War Department, thus requiring the action of one of the great executive departments of a Government, controlling a continent, on an extra issue of writing paper costing from 12 to 18 cents per quire, or envelopes costing 27 cents per 100; the cost of the whole authorized issue of these articles for a brigade being but \$2.35 for three months, or 78 cents per month, and for the other commands enumerated, in like proportion; while at the same time, officers of the Inspector General's, Pay and Quartermaster's Departments, subordinate to the respective commanders referred to, may use all that is required for their public duty.

Will it be said that lamps and mineral oil provided at the rate of one burner to every ten men, one burner to each office room, four burners to each library room, and so on, with oil at the rate of 2 ounces per hour for each burner, provide sufficient light? We all know that they do not. And though an increase is afforded through the flexible condition as to hours of illumination, it is done, to a certain extent, by stretch of prerogative.

The cost of oil with transportation added, fixes the average expense of each burner at about $\frac{1}{4}$ of a cent per hour, at which rate, it would seem, an adequate number of ample burners might be allowed.

In the cases both of stationery and oil, the necessary amounts are had, but in a measure by evasion, the effect of which has a lowering tendency on the high moral standard so stoutly maintained by the Army.

I assume that no one, not even the most conservative of all red-tape adherents, will take the ground that unnecessary papers should be made. And yet, I do not think the careful observer of present systems, if he be at all possessed with the spirit of

progress, can escape the conviction that much of our paper work may be advantageously dispensed with. As I have before stated, some of them are the outgrowth of particular and individual cases, and serve no important purpose in the general management.

To illustrate this point I refer to the weekly and monthly statement of funds, a paper devised and instituted for the purpose of detecting defalcations, but which, so far as I am advised, has never in a single instance served its purpose. Yet we burden our officers, the mails, official correspondence, the depositories and the files with these papers on an average five times a month, from every disbursing officer.

The Account Current is rendered monthly. Is it too much to trust an officer one short month? If so, he should not be trusted at all. And if, at the end of each month, he is required to promptly file his account with all the vouchers to sustain it, through which a fraud or an error may be definitely discovered and determined, should not that be sufficient? The bureaus of the War Department and the Treasury Department should be the main guards and protectors against fraud. Let the work of these be brought up to date, and detection will follow crime, accurately and surely, but it can never be done through the medium of a summary which affords no accurate information.

It seems too, that many of the papers now required at Department and Division Headquarters, may be omitted by simply providing that those to be filed in the War Department shall pass through the respective headquarters for remark and revision. Others, such as the estimates for stores, may be simplified, and still others dispensed with.

I have long held the opinion that property vouchers may safely be reduced in very nearly one-half, without impairment to the public security, and have on two occasions submitted projects to that end.

With the many conditions surrounding the transportation service, especially those pertaining to land grant and bond aided railroads, it has long seemed that our shipping system had been brought into the best possible state of perfection. But it is still complicate and cumbersome, and can, it is thought, be simplified, with equal protection to the Government, and accelerated service to the departments.

Circuitous, clumsy and slow methods of purchase and supply should be shortened, simplified, made prompt and effective.

Think of the demand made upon the foresight of an officer when it is required that he shall provide for the wants of his post, itself a good sized village, by requisitions made two months in advance for the period for which they are required, and then reflect on the delay in making purchases under our system even after such be authorized.

I can see no advantage whatever to the public good, and every disadvantage to the Service, in the delay enjoined under our methods of making purchases. For the larger lots of supplies, which may easily be foreseen and provided for in advance, and which admit of wide and general competition, a longer period of notice to bidders may properly be held to. But for the smaller lots of miscellaneous stores required at posts, for which competition is ordinarily limited to a single place, three days' notice by circular is better than ten or twenty, secures more attention from dealers, and enables the purchasing officer to more promptly meet the need.

Services, other than personal, must be contracted for in the same cumbersome, tardy way.

An amusing story is told of the strictness with which the departments hold officers to these rigid rules in relation to procuring supplies and services under advertisement and contract. Some valuable Government property stored on or near a dock had taken fire. No other means being available, the responsible officer engaged the services of a fire-boat to suppress the fire and save the public property. The voucher covering payment for the service was suspended for the reason that the officer had not invited bids and entered into a contract according to law.

How long could the existing conditions last in time of war? Not a day. They would necessarily fall. Unwieldy and unbusiness like, they would speedily give way to simple, direct and effective methods. Yet these are the conditions under which, in peace, we train our young men for war, establishing in their minds delay and circumlocution instead of directness and promptitude; clumsy methods in the transaction of affairs, instead of simple and effective ones.

Before passing from the subject of provision for supply, I would ask, is it best that the foods for the Army be sent so infrequently to posts, or at such distances from the markets as to make sure they will be stale before they are consumed? Is it liberal to restrict the list to the extent of not providing the ordi-

nary commercial foods and table luxuries? If losses have arisen, rather through an over supply of quantity than because of the non-sale or issue, is all need of such articles to be denied the consumer who has a right to expect everything in reason? I ask these questions in a spirit of justice rather than of criticism, and to indicate the view taken of the matter by officers stationed at remote places. I do not think it too much to say that near commercial centres, the Army relies more on the merchant for table necessities and luxuries than on its authorized source of supply.

One requirement of our system that appears to me to possess most objectionable features is one imposed by law. Construction must, when practicable, be done by contract. As it is nearly always practicable the contract method mainly governs. But it works disadvantageously to the Government, inasmuch as it entails the poorest possible class of workmanship that can be made to pass by the contractor. It would seem that public buildings should be built of the best materials and in the most substantial manner. The contract system does not secure this, but rather the contrary. While it is possible to inspect materials as they are brought upon the ground, it is absolutely impossible to secure excellence of workmanship in all the details without many expert inspectors, the cost of which would be too great, and the risk of collusion too dangerous. Without constant expert watchfulness, at every point and every moment, the work will be slighted. The very system is a premium on fraud, and adverse to the public interest. It is too much to expect of the average contractor that he will put more expense on a work than he can get along with. The result is, we get a poor class of mechanical talent, have to put up with bad workmanship, and reach imperfect results. The draughty houses, with yawning outside cracks and joints and gaping inside seams and fittings, too well attest the truth of these remarks.

I have personally had occasion to make openings in the walls of an important public edifice, constructed by contract under the supervision of a most competent and careful officer, the workmanship of which was so bad that it was a wonder how they stood at all.

I cannot doubt that a far better and more substantial class of work, at little if any increased cost, would be secured for the public service throughout, if officers were required to employ mechanical talent by the day or month. Men so employed would

faithfully carry out the orders given them as to the character of the work, from the head down to the lowest, knowing that their very places depended on it.

It will be said that it is our public policy that the public purse must be open to all competitors, and this is, beyond question, the true policy in all matters when the article to be obtained is one that can be readily judged by any well-known and established standard. Mechanical skill is not such an article. While it is easy to determine whether or not a man does good work, it is impossible to make sure that he will do it when tempted by greater gain for doing it imperfectly.

One system begets fraud and imperfect results, the other fosters honesty and excellence of workmanship and secures the best outcome.

I must believe that if these conditions were plainly pointed out to Congress, it would amend the law in regard to the hire of skilled labor.

There will be no denial that the Treasury must be protected against dishonesty to the fullest extent, and there can be little expectation that the affairs of the public should be conducted strictly, as simply and directly as private matters.

But the public may well pattern in many respects after the system, the order, the simplicity and yet withal the stern vigor of many of our private gigantic establishments.

It will be said that one great difficulty that lies in the path of reform is to get the necessary legislation, but my observation leads me to the opposite conclusion that Congress is ever ready to pass beneficent laws when it is plainly shown that the need exists.

It is not alone to legislation we must look for all benefits; they must in a large measure be brought about by ourselves.

What may be done in the way of reform has been signally illustrated in the pension or medical record division of the Surgeon General's office during the past three years, under the direction of Captain F. C. Ainsworth, Assistant Surgeon, U. S. Army. This division has now been consolidated with the pension division of the Adjutant General's office, and the whole is known as the Record and Pension Division of the War Department. When Captain Ainsworth took charge of the division named, of the Surgeon General's office, it was almost hopelessly in arrears, yet under the system he inaugurated the vast work

has been brought to date, so that inquiries formerly requiring sometimes six months and sometimes a year for answer, can now be answered on the day of receipt. In a similar manner, it is stated, that cases relating to pensions in the War Department that were 40,000 in arrears on July first last, have been brought up to date under the management of that officer.

It is exceedingly gratifying to note that a decided step has been taken in the direction of examination for promotion, recommendations to that end having been embodied in the reports of the Secretary of War for 1886, 1888 and 1889. The measure has long been urged by some but vigorously opposed by others. It has, however, been steadily gaining ground and now seems likely to become law. The examination proposed is not a mere educational one, but is broad in its application, and bears chiefly on the officer's fitness for the higher position, physically, mentally, morally and professionally. I firmly believe that the measure once adopted will have a decided and lasting benefit on our service. Officers will know that their positions are endangered by slothfulness and dissipation, and insured and strengthened by study and application to their duties. Incompetent, inefficient or disqualified officers should be weeded out with relentless hand. Worthy material alone should be retained. Sentiment is one thing, public safety another. The man who has become fairly disabled in the Service should be forever cared for; on the active list, so long as fit, on the retired list, when unfit; but the one who has impaired his mind or body by excesses should be unhesitatingly disposed of.

Lineal promotion throughout each arm of the Service, though impairing regimental *esprit de corps*, yet seems a fairer and better system than the present one, and will doubtless soon follow.

Increase of pay of the higher grades of non-commissioned officers will undoubtedly improve the general bearing and conduct of enlisted men, and will likely be provided for at an early day.

One great reform, which it seems all important to reach, is that all selections for promotion shall be based on merit alone, and not on political or social influence. This will be, in a measure, reached by the provision for examination for appointment and promotion, but the rule should be laid down and held to with unswerving fidelity, that no officer shall be selected for advancement whose record does not give abundant proof that he is

especially qualified for the position he is to be thus elevated to.

Reviewing our existing system in its entirety, one cannot fail to be impressed with the belief that we have diverged very broadly from the purpose for which it has been brought into existence, viz.: the main prop and support of the country in case of war. For that purpose solely are we the employed and paid servants of the people. To that end should we devote every talent and energy in our possession. We must not allow ourselves to be absorbed in means and forget the end; to pursue the shadow and miss the substance; to lose sight in the provision for the present of the main object in the future; to bury ourselves beneath a mass of cumbersome, intricate, inefficient machinery, with the expectation of its serving to advantage when we are compelled to throw open our lists to partially or wholly untrained volunteers from civil life.

I am such an admirer of the genius, originality, inventiveness and capacity of our country to devise and formulate for itself in every direction, that I refer to a system of another country with reluctance, still, I advert to the great simplicity of the organization of the German army throughout, yet having vigor and system in all its parts. The combination of battalions into brigades, brigades into divisions, and divisions into corps is most simple and uniform in all branches of that service. The methods of mobilization, of reinforcement, and of supply are comprehensive, clear and alike everywhere. And above all, as is stated by one of our ablest young military writers, "the secret of the efficiency of the German military system lies in the division of responsibility, and thorough decentralization, by which every man, from the monarch, to the private soldier, has his own especial part to perform."

What I urge is a simple, clear, comprehensive, vigorous system, uniform, easily understood, clearly defining all duties, devoid of circumlocution and delay, inspiring confidence, demanding precision, tending directly and mainly, but surely, toward the end for which the Army has been created and is sustained—the safety to this Union of all the future.

The origin of reform should be from within rather than from without. It can scarcely be carried out by the Secretary of War, whose term, as a rule, is not a long one. The Army is a permanent body, whose officers are daily gaining experience and growing in knowledge of their profession. To them, and to them

only, have we a right to look for whatever of improvement and advancement we are to enjoy. From them we must expect that study, research, thought and result so necessary to keep us abreast with the front ranks of national advancement. The needed reforms will surely come; not perhaps as we may wish them, all at once, but possibly slowly, surely, in a one-at-a-time way. They may even arise in one branch or department long before in any other. When the man appears, his work will be done. He will leave his impress graven deeply on the face of our system. Patiently and trenchantly he will delve, until the whole fabric, root, branch and body are laid bare to his discerning eye and judgment. Profoundly will he consider the past, its teachings, its record and its commands. He will scan the present and the future with their needs. With infinite pains he will weigh, and group and consider, and then decide and formulate.

As the skillful gardener prunes his trees, he will lop off a branch here, uproot a stem there, destroy every offshoot impairing the health of the tree.

He will mercilessly insert the knife to prevent decay and restore health. He will clear away all rubbish, but he will conserve all that is sound, with fostering care.

Somewhere is being perfected his broad comprehensive brain, somewhere is being gathered the knowledge, grasp and experience to fit him for his great mission.

Whenever he comes and wherever he appears, we shall recognize him, and do him homage.

It is perhaps too much to hope for any one man in any one period to accomplish it all. But one man can put forth one idea and another a second and so on. In a multitude of counsels there is wisdom. The coming man who is to influence our army administration most, will be he who can best aggregate the wisdom of those by whom he is surrounded and supported. And after all, the coming man in our Service, is the aggregation of manhood, intelligence, study, force and energy of the many, stimulated by lofty patriotism and deep seated love of our profession.

THE PLACE OF THE MEDICAL DEPARTMENT IN THE ARMY.

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THE object of this paper is to discuss the duties and place of the Medical Department of the Army, to invite attention to features frequently overlooked or not appreciated by the line, especially to point out defects in the system, and to suggest changes looking to the greater efficiency of the whole Service.

The profession of arms, like its counterpart the church, is among the most conservative of institutions, but nevertheless it does move. Otherwise our friends of the sister service would still be merely sailing masters and nautical experts, non-combatants manipulating their ships so that the soldiers afloat could carry on their warfare, the drivers of the light artillery would remain hired civilians, running away when most needed, the pioneers would be, as once they were, impressed laborers, and the adjutants general might remain cunning scribes, clerks to reduce to writing the orders of chiefs too ignorant or it might be too proud to write.

It will not be disputed that those rendering medical service in the mediæval armies occupied very inferior positions, and it is not worth while to trace the path by which their European successors have reached their present improved but not yet altogether satisfactory place. We are concerned with present problems and not with that limbo into which plate armor and feudal caste, barber surgeons and marshals of the verge, smooth-bores and authorized rapine have fallen, and into whose shades muzzle-loaders, stocks and other effete conceptions have retired before our own eyes. Our attention is occupied with the United States medical officer of to-day, and it is proposed to defend the affirmative of the proposition that he is an essential part of an efficient army, and as a military factor in it is entitled to precisely the same consideration and respect on account of his position as are accorded to any other functionary of similar rank.

I know that I shall at once be wounded in the house of my friends by the cry, directly, or as a quotation, "I am not a soldier, I am a doctor." I have heard it more than once. And those gentlemen of my corps who make this disclaimer will generally go on to maintain that a doctor is a much more useful, dignified and important person than a soldier, of whatever grade; always closing with the explanation that the President can make any man a colonel, but that he can make no one a doctor, and further can give no doctor a place in the military service. In other words, that the military doctorate is surrounded with an intellectual radiance before which the glory of arms must pale its ineffectual fires. Similarly, considerate line officers will explain their uniform use of the civil title as a compliment to the doctors, whom they affect to believe prefer it, but when questioned promptly admitting that they themselves do not look upon doctor as a greater titular honor than colonel, major, captain or lieutenant. As between medicine and war, the art of healing and that of logistics, how far by each the world has been influenced, history has been made and nations created, it is not necessary to discuss just now, but this point of comparative compliment in the titles will be brought up later. But the general view, expressed more or less frankly, is that medical officers are civil functionaries, non-combatants attached for certain utilitarian reasons to the armed forces of the State, and, at the very utmost, officers of the staff with no inherent authority, who are especially and properly debarred from more than nominal control over the rank and file, and have even that only for limited purposes and with restricted power.

There is no more doubt that originally military physicians were civilians, more or less closely attached to the army, as are the acting assistant surgeons of to-day, than that the adjutants general have been evolved from secretaries and the supply officers from purchasing agents. And, further, in our own earlier Service these medical attachés were practically political appointments, sometimes of great excellence and sometimes of none. But in 1834 the corps was reorganized, or, more properly, organized, on a distinctive basis of merit and merit alone, open to all respectable comers, but guarded from unworthy intrusion by a barrier of examination that, with the lapse of time, has gradually grown stouter and higher. There has been but one instance since 1834 of admission to the Department except as then prescribed.

The military foundation upon which the Medical Corps rests is the enactment of February 11, 1847, that the rank of its officers should be arranged upon the same basis as then determined their pay and emoluments, with the proviso that such rank shall not entitle them to command in the line or other staff departments of the Army. This proviso although apparently placing a special limitation upon their military functions really establishes an equality with other staff officers, none of whom is eligible to command outside of his own department without special assignment. The opinion, by whomsoever held, that medical officers are civilians and not military men is certainly disposed of on all technical grounds by a study of the act referred to, and an examination of the commissions that they bear. If they are not technically military personages, then are no staff officers.

The other and more important point that, notwithstanding their commissions, they are virtually civilians, is held only by those, either without or within the corps, who entirely misapprehend the extent of their sphere. A medical officer has certain and very important clinical duties which in great part, but not altogether, are common to civil physicians. Their performance can hardly detract from his military character, else see what follows. A quartermaster buys horses as might a drover, and erects houses as might a builder; a subsistence officer purchases and distributes food, as other purveyors; an engineer for years together improves water-ways, establishes boundaries and superintends light-houses, as do other engineers not commissioned; and an ordnance officer may see no soldier and wear no uniform for long periods while building guns that, it is not sacrilegious to say, certain civilians also do with great skill. All of these gentlemen would feel much aggrieved to be told they were no soldiers, because they were devoting their time to work identical with that of civilians. Why, then, should a medical officer, a part and admittedly a very important part of whose duty is the care of the sick, be looked upon as a civilian and as such alone, merely on that account? It is certain that these and other "non-combatant" duties do not in themselves detract from the martial qualities of the actors; for, having special qualifications, a captain of infantry has been known to act for a post surgeon, and a captain of cavalry has efficiently discharged under detail the functions of medical inspector of an army corps, without vitiating their line commissions. I know that extremists hold that what is

not on the firing line is an appendage almost parasitic, if not destructive, and that the so-called "effective force" is the army. They would class all the staff departments together as evils, possibly necessary, but certainly evils. Campaigns planned on paper and in peace are chiefly concerned with an enemy to be outwitted and overpowered, forgetful that an armed force alone is primarily helpless and later self-destructive—earth-borne by its own weight. The various staffs vitalize, nourish and render mobile the commands through which they are diffused. To go back no further than the Army of the Potomac, a trio reappears unheard of by most of the rising generation and to all not participants only names and shadows, but very dear to the men whose muskets and sabres rescued an imperilled nation. Seth Williams, Rufus Ingalls, Jonathan Letterman! One was not behind the other; administrative and executive giants, whose powers and their exercise the great organizer, McClellan himself, need not hesitate to admire! Had the successive chiefs of that often ill-commanded army possessed the broad military grasp of any one of those men, some campaigns might have had other endings. No American soldier can study American war and venture to ignore such allies of the line, such essential parts of the whole, as were those superb staff officers. Nor is there reason to doubt that their successors are now in commission, awaiting the touch of war to cast off their confining trammels.

But beyond the inferior and auxiliary state of "mere staff," to which many would consign them, civilians in good faith and others in a derogatory way often describe the medical officers as non-combatants, and these last use that expression in a different sense from that as applied to a quartermaster or a subsistence officer. Non-combatant seems meant to represent a passive agent, one who can take no credit in victory and has no share in defeat, a neutral if not a neuter functionary who is present in some transcendental capacity and is mysteriously protected from all risk. Curiously, some who concede all that is claimed as to the *fact* of the commission ignore its essentially military character, owing to this assumed limitation. The assumptions upon which this limitation is based are that medical officers are simply and only surgeons (as they are unfortunately mis-named), whose entire duty begins and ends with the care of men who may be wounded by the chance of battle, and that this duty is always discharged at the rear and in complete safety. Along with this is the further

notion that however devoted "doctors," civil or military, may be in the presence of grave disease, their profession *per se* disqualifies them from essential participation in those stirring events of camp and field that yield martial credit. Indeed, besides the non-combatant fetter that cripples its wearer in campaign, the professional mantle itself is supposed to incapacitate those whom it envelops from a successful race even for civic reward. Attention is invited to these disparagements as a group, regardless of the order in which they have been stated.

A late and excellent authority makes these definitions:

"A combatant is a person who, with the special authorization of his government, takes part either directly or indirectly, in the operations of war. The term includes in addition to the troops of the line all staff officers, surgeons and chaplains, officers and employés of the supply and transport service, etc., etc." "A non-combatant is a resident of a belligerent state who takes no part in the war."* These definitions are correct and their general acceptance would place the medical staff at least upon a proper formal basis. But definitions, however exact, will not at once replace misconception, and the impression continues to be fostered that upon a medical education no military superstructure can be built. Nevertheless, the commanding general at Bunker Hill, who fell with the redoubt, was known to his troops simply as Dr. Warren. General Mercer, who died in victory at Princeton, was a surgeon at Culloden, was wounded under Braddock, and actively practised medicine in the interval between the French and Indian War and the Revolution. Col. Edward Hand, of the Pennsylvania Rifles, later a general officer and after the War a member of Congress, was a medical practitioner before the call to arms. Either he or a namesake of like rank was at one time spoken of as surgeon-general. Dr. William Eustis, a distinguished medical officer of the Continental Army, was Secretary of War from 1809 to 1812, besides holding other important offices of state. To pass to the Civil War, we find one officer who was an assistant surgeon when it broke out become, with continuous service, a colonel of regular infantry, during the hostilities a general officer commanding a division constantly in the field, and retired for wounds received in that capacity. To the intelligence and military sagacity of another assistant surgeon the Army is indebted for the best organized system of military signals, and one that under the test of

* Davis. "Outlines of International Law," pp. 232-3.

war was both efficient and unique. I have personal knowledge of at least two officers now in the line, and possibly there are others, who were physicians by profession; and doubtless during the War there were many more. The late distinguished Surgeon-General Lawson was a lieutenant-colonel of volunteers in the Florida War, still holding his medical commission.

There is evidently, then, no inherent incompetence that unfits physicians as such from learning the Art of War and to command troops as efficiently as any other men not specially bred to it from youth, with the probability that their trained minds would acquire the principles more speedily than raw civilians lacking both military and scholastic culture. By the Art of War and the exercise of command I mean the higher military functions, and not the mere memorizing of drill formations that every smart sergeant knows as well as his officers. The reason why professional men so seldom seek line commissions is that few, who by prolonged and costly study have acquired a special education, are willing to discard it for any pursuit, however acceptable it may appear at the time. This was illustrated within my knowledge during the War when a peculiarly intelligent and gallant surgeon declined the colonelcy of his regiment, offered by those whose observation of him in the field led them to desire his leadership. He intended to resume his profession in civil life and simply could not suspend his familiarity with it, willing as he was to serve his country if necessary at the cost of his life. There is no reason to suppose that this instance stood alone.

I insist, then, with much confidence, not that medical officers and line officers are interchangeable factors in the organization of an army, but that, as is sometimes alleged, a "doctor" by the fact of his becoming a doctor has *not* had the qualities inherent in a natural soldier eliminated.

But it sometimes happens that those, military as well as civil, who have not had extended experience place the wrong inflection upon "non-combatant" and imply by voice if not by word that the Medical Department is always in a bomb-proof, and is only under fire in the same sense that the officer with the ammunition train is "where the bullets are the thickest." This question of personal peril would not be introduced did not the uninformed so frequently allude to it and in such a way as to make for the medical corps a service reputation as being not only unharmed but unthreatened. I know of none of much service in the face

of the enemy who indulge in any innuendoes upon the exposure or the courage of their medical comrades, but it is those speaking in the plenitude of their ignorance who create such erroneous impressions.

It is self-evident that there is no rear in an Indian fight, and that one scalp is as acceptable as another to a savage foe. Grisson fell at St. Clair's defeat, Gatlin perished with Dade as Lord with Custer, and within the past five years Maddox was killed in an Apache affair. Doubtless others of whom I am ignorant have died, and still others have been wounded. In the latest severe Indian campaign a young medical officer, happily unharmed, was complimented in orders for his conduct as a soldier. But beyond such exceptional conditions it is proper for our purposes to quote experience in civilized war. As far back as 1814 the chief medical officer made a report to the surgeon-general, from which these extracts are offered: "In events of high importance it is seldom the medical staff are noticed. This is discouraging to the ambitious young surgeon of the army. It may be alleged that the surgeons, being non-combatants, are out of danger. This, however, is not always the case. During the investment of Plattsburgh by the enemy, the surgeons were constantly passing from fort to fort or block-houses to dress the wounded, exposed to a cross-fire of round and grape-shot, while the greater part of the army were covered by fortifications. The cool bravery of the surgeons was, in private conversation, noticed by the commander-in-chief; had half as much been reported to the War Department respecting them, they would have felt themselves amply compensated." The writer then goes on to explain that he himself was in another and comparatively protected station, and that there is no personal commendation concealed within. In the same war Andrew Jackson, in a general order upon the battle on the plain of Chalmette, published to the army, says: "The medical staff has merited well of the country, and the General would not do justice to his own feelings, were he to withhold from Doctor Ker, hospital surgeon, who volunteered his services, and Doctor Flood, the just tribute of applause, deserved by them for their medical skill and personal bravery." After Monterey, General Worth officially thanks the medical officers, whom he mentions by name, "who were ever on hand in the close fight." Carleton, a participant in and the historian of Buena Vista, mentioning certain medical officers by name, says:

"The courageous manner in which these gentlemen passed along the line and rendered assistance to the wounded, oftentimes at the moment they fell; the positions of imminent peril to which they cheerfully and at all times hurried whenever their professional services were required at the instant * * * gained for them the unqualified praise of the whole army." In a special report by General Wool as to the "important and gallant services" rendered by Assistant-Surgeon Prevost, whom he employed as an aide during the battle, after particularizing his achievements, he recommends him "to the special notice of the Secretary of War for his daring courage and gallant bearing on the fields of Buena Vista." After Cherubusco General Worth reported: "The medical corps [mentioning the officers by name] presents claims to especial thanks and admiration—ever among the most fearless and indifferent to hazard during the conflict. * * * " At Molino del Rey one medical officer was slightly and one mortally wounded, the latter, Assistant-Surgeon Roberts, having taken command of Company I, Fifth Infantry, during the action, its own officers having been disabled. As General Worth expressed it, "He assumed the duties of his fallen comrades and was desperately wounded." The Medical Director of General Scott's army also was wounded in action so as to be unable to take the field for several months. During the siege of Puebla, September 13–October 14, 1847, the commanding officer made large requisitions on the medical officers and the convalescents under them for purposes of defense, and they were nightly on guard, and he reports himself "greatly indebted" to them.

In the War for the Union the record was the same in kind but greater in degree, as the forces engaged were larger. At Antietam alone three medical officers were killed; White, the Medical Director of the Sixth Corps, Revere of the 20th, and Kendall of the 12th Mass. Vols. It would be impossible, even were it desirable, to give the details of hazard and exposure to fire throughout the War itself, and I content myself with quoting from Brown, the historian of the corps, this summary: "That they did not shirk the post of danger is most conclusively shown by the following record of the casualties of the Regular and Volunteer staff during the War. Thirty-two were killed in battle or by guerillas or partisans, and nine by accident. Eighty-three were wounded in action, of whom ten died. Four died in rebel prisons, seven of yellow fever, three of cholera and 271 of

other diseases, most of which were incidental to camp life or the results of exposure in the field, making a roll of honor embracing 409 names of those whom it is a common error to consider not exposed to the dangers and chances of war." When 115 officers are killed or wounded in action, much more than the casualty list of all the other staff departments combined, it is time for non-combatant to be replaced by some more apt epithet. Of course, this enormous number of hits implies a very large aggregate within the zone of fire, an aggregate that the greater extent of that zone in the next war will then much increase. The collapse of the Confederacy has deprived us of much official information regarding its medical officers, but there is no reason to suppose that they were less exposed than were their Federal rivals. And it is a pleasure to note this brilliant special compliment from Major-General J. E. B. Stuart, which might be coveted by any military man. In his report of the Gettysburg campaign he says, Surgeon Talcott Eliason, of his command, " though without a superior in his profession, would, from his conduct on the field, excel as a colonel of cavalry."* Even a " combatant " and a " soldier " could ask no more to establish his military character.

The record in war, which cannot be gainsaid, establishes as fair a military position, as far as commission and exposure can make it, as any branch of the staff can display. One would feel called upon to apologize for laying such stress on the exposure of military men, which should be accepted as a matter of course, did not " non-combatants " and " hospitals in the rear " play so conspicuous a rôle in the argument of those who are disposed to deny military functions to the medical staff. Necessarily a certain large proportion of the Medical Department cannot be on actual field of battle, which is to a far greater extent true of the Supply Departments at large, of many reserves and of numerous line officers who are engaged in organizing and equipping new levies.

Notwithstanding a public advocate of such doctrine is liable to be charged with unbecoming vanity and is apt to be misconstrued, attention is now invited to the propriety of using within the Army the military instead of the civil title of the medical officer. " Doctor " no longer carries the weight that derivation only from a learned profession once gave it. There are men in

* " Official Records," Series I., Vol. xxvii., Part II., p. 685.

the ranks who bear it as rightfully as the Surgeon-General himself. Derived from so many sources, frequently abused, bestowed by popular voice or formal authority upon charlatans, druggists, dentists, veterinarians and clergymen of various degrees, sometimes with no right, sometimes in sport and sometimes most worthily, by itself "Doctor" means nothing. I fancy no one but a very young man takes much pride in this title as a title. Love and respect for the profession of medicine are very different from infatuation with an appellation. The sadly abused doctorate may be abandoned by the higher ranks of the civil profession, toward which some agitation at present points, but the science and the art of healing will never fall into disrepute among those who love to analyze the practical problems of human vitality and to relieve its ills. As will be noted later, the medical officer has functions quite distinct from those that are clinical, of which some are concerned with his special profession, and some are based upon the commission itself. Therefore, regardless of the confusion in which the use of a common title is liable to involve all kinds of doctors, there is, in an organization so systematic as the Army, every reason by analogy why the doctors, to speak of them by their most conspicuous function, should be graded among themselves and in relation to their comrades of other faculties. No feeling of propriety is satisfied when a newly-appointed youth and a veteran on the verge of retirement are addressed in precisely the same style.

It is my contention that in military life the medical officer should be known by his military designation, through its various grades. I know that this is a hard saying at its first expression to the most of the line, and to many of the medical staff on whom the unaccustomed title will rest uneasily. The latter will repeat the *ad captandum* statement that the President himself can make no man a doctor: to which is the rejoinder that under the law the President can make no man a colonel in the Medical Department, excepting as he makes himself. Others will say that his commission reads surgeon, or assistant surgeon, let him be content. So are the supply officers commissioned quartermasters or assistant quartermasters and commissaries of subsistence; but a wholesome experience has settled that the captain, major, and so forth of the various departments are the suitable titles for their address. There is absolutely no distinc-

tion between the commission of a surgeon and that of a quartermaster, except in those very words ; but no Regular quartermaster since the first tent was pitched was ever addressed as such, nor should he be. The general response, without consideration, is that after all they are doctors and that it is absurd to suppose a doctor can be any better or have any more influence than his character and personal learning bestow. In the same spirit the impulsive and arbitrary war secretary, in 1862, replied to the Surgeon General's request that the medical directors of the two larger armies should have a temporary rank beyond that of major, held in common with vast numbers of their subordinates, "Refused unless it can be shown that the skill and efficiency of surgeons are increased by an increase of rank and pay." By a similar argument the chief quartermasters and subsistence officers would have lost the increased rank with which they were invested soon after the organization of the Army of the Potomac. I no more pretend that a physician becomes more skilful as a physician, or as between two, because of a title corresponding to a higher grade, than I would affirm that an income of \$3000 would make him wiser than would one of \$2000. Indeed, I am perfectly willing to admit that frequently the younger members of the medical corps are more expert in the immediate *technique* of the profession than some of the older men, but I do not admit that they are more valuable officers throughout. That the claim is legitimate, even though it may be considered injudicious, is shown by the practice of the Adjutant-General, whose formal communications and orders always bear the strictly military title—an example commended to others. The remonstrants must remember that much of military progress and most of military respect and authority rest upon military titles. In the military organization there is a common and wholesome respect for rank. A major may not have more intelligence than a captain, but as he has more authority he is listened to with more respect. The military auditor is insensibly impressed by the title, and when the individual capacity of the two men is not known, the field officer's opinion always carries more weight than the subaltern's. By so much the more does a military title give its bearer among military men a respect that is not yielded to a civilian. If, as I firmly believe, medical officers are a necessary and an important part of the military establishment, then they should have the same adventitious assistance that in every other department is

so sedulously cultivated as a support to place. It is true abstractly and in the civil world that the strength of the medical corps depends upon its relation with science. But within military lines respect is associated with rank and in compliance with that unconscious habit rank should be distinctly and constantly defined. Why there should be objection to this, either within or without the corps itself, I fail to understand. Medical officers certainly cannot desire to be classed as aliens by those among whom they must pass their lives. Military men surely have the intelligence and should have the judgment to recognize as comrades others than the actual combatants in the most limited sense. In furtherance of this aim the uniform was given and salutes granted long ago; rank was added as a distinct necessity growing out of the Mexican War; precedence on occasions of ceremony and on all mixed duty not involving command has long been acknowledged; and the title as a common, not an exceptional, practice deserves similar recognition. This if for no other reason than its teaching influence over the rank and file, who will unhesitatingly do what the captain directs when they might neglect, if not question, the injunction of the doctor.

The inherent affection and wholesome respect for rank are conspicuously observed in the captain, tenacious of his brevet as major or lieutenant-colonel, in the colonel of his as general, shorn of actual authority as it has become. There are also medical officers who have brevets, some won by gallant conduct on the field, some given for service as faithful and meritorious as that similarly rewarded in the line, but how rarely are they recognized in common speech. Like all brevets, these are now in abeyance, sounds and nothing more; but like all brevets they are liable at any time to be vitalized by the will of the President, when the commissions they represent would have no such limitations of rank or command as are supposed to hedge the commissions in the corps.

But the essence of the whole matter is to be found in the proper answer to the question whether medical officers, after all, have any military functions? Are they not, as formerly, merely attached civilians to whom uniforms have been given for identification and commissions to insure tenure of office; intelligent gentlemen with the ordinary manly attributes, who accept hard service by the example of those around them, and who hold their own under fire by the natural courage inherent in human nature?

Are they not simply doctors, carers for damaged bodies, a high grade of servitors for the convenience of the fighting line, the soldiers, but not themselves soldiers? The subaltern, occupied with keeping the files closed, with repeating to a platoon the captain's drill commands, with occasionally exercising a company by himself, with taking roll-calls and knowing little more of a medical officer's duties than that a private missing from the ranks is in hospital and after awhile reappears because the doctor has marked him for duty, and recognizing that the same doctor pays many professional visits to his own sick babies, would naturally take that view in time of peace. The commanding officer, of the type that fortunately grows less year by year, sees in the medical officer only a convenient special agent who has no original authority nor jurisdiction and can have none, even when released from immediate control, as would a major or captain of the line, and looks upon him with the subaltern's eyes. If they are right then these should be merely physicians with as clearly defined and limited duty as those attending hospitals and dispensaries in civil life. A line officer should command the hospital and be responsible for its management. The doctor should do what he could for the sick, and nothing else. At distant posts a sufficient number of these would have to live among the troops. Near towns they could be obtained for and be paid by the visit.

They are wrong. In garrison, on boards and courts, in all but the distinctive operations of the line, the medical staff does its full share of military duty; in war, for whose operations peace is the preparation, its rôle is vastly more important, and then it is practically more independent of all but the most general control than any other branch of the staff. It is as a clinician that the medical officer stands apart from and above the line and in the care of the disabled, by virtue of this special function, merits Cicero's eulogy, that "men in no way approach nearer the gods than in giving health to their fellow men." With a knowledge of military conditions and necessities engrafted upon this special education, he has an equally important potential power in the prevention of disease. And precisely as he understands the conditions of military life is he most efficient in that respect. Those who discourage medical officers from pursuing any study but that of medicine proper, stand in their own light.

It is not, however, by carrying out specific orders, carefully provided for him as one of the staff, that the medical officer's

duties are completed. In more than any other branch it is his province to originate work. This is not always clearly understood. While in common with every other officer of a garrison, the *execution* of work is limited to his own organization, it is especially required of him to make a frequent and comprehensive survey of his surroundings, to draw attention to the sanitary errors and, by implication, to point out methods for the improvement of what already may be good. With an intelligent commanding officer it is chiefly a question of tact how far these recommendations shall become effective; with one who is ignorant or narrow-minded, the medical officer's lot is peculiarly unpleasant in this respect. But in either case his duty is both important and clear, and by their insistence upon it the regulations relieve him entirely from the charge of intrusion. Nevertheless were it not specifically required, it would be his moral duty to report for the commanding officer's information what now is enjoined. This power of the initiative is very limited among the remaining staff.

But it is frequently insisted that they are merely advisors; that their functions begin and end with laying certain opinions before the commanding officer, with whom rests and from whom issues the determining action. Nothing is better settled or more reasonable in military life than that there can be but one commanding officer, and I know of no medical officer who attempts or desires to arrogate to himself those functions in a post or with an organized command. Nevertheless in his ordinary duty as a staff officer he has in practice important and substantially independent control. His daily duty of designating the sick and the well was outlined in the first regulations of the army, those of 1779, to wit: "When a soldier has been sick, he must not be put on duty till he has recovered sufficient strength, of which the surgeon should be the judge." In all matters pertaining to the sick, to those claiming to be sick, and sometimes to those who insist that they are well, the medical officer's authority is practically final, and it is so regarded in common speech. For instance, the commanding officer of a Regular regiment reporting his absence from important engagements on the Virginia Peninsula in 1862, says* he was on sick report "and was ordered by the assistant surgeon to the rear," and again, on another occasion, that he "was sent by the assistant

* "Official Records." Series I., Vol. XI., Part II., p. 363.

surgeon to the rear." So the commanding officer of a Regular brigade reports that his predecessor "had been ordered by the surgeon to the hospital at general headquarters."* These were not crude volunteers, misusing terms and misapprehending authority. They were educated soldiers, who recognized the authority and reported the facts. Again, it fell within my personal knowledge that between the fights on the Chickahominy a junior medical officer took the responsibility of determining that the commander of a Regular regiment was unable to discharge his duties, although attempting to do so, and made himself responsible for devolving the command upon the next in rank. So that although medical officers may be supposed to have no command, they have an authority that is equal to command.

I think the notion prevails that the management of a post hospital is a very simple matter from a military point of view—that any one can command sick men. Successful command implies obedience, and to reduce to one level as many men as are contained in an ordinary company of infantry, gathered from ten or more different organizations, in varying degrees of physical vigor, for whose health allowance must be made and who have no homogeneous model, is no trifle. Besides carrying out the scrupulous care necessary in the building itself and its appliances, and the preparation of the elaborate professional reports, the detachment of a dozen or more men, whose administration is identical with that of a company, must be so managed as to obtain the most effectual discharge of their arduous and often distasteful duties.

To sum up his position in peace. The medical officer is a staff officer of the post in that he represents the commanding officer for certain purposes, he necessarily exercises direct command over the hospital as just observed, he is a representative of the general staff in all his relations to the chief of his department in Washington and to the Army at large and, what is rarely recognized in terms, he differs from all other officers not in post command in that he is frequently compelled to inaugurate business, to originate duty.

But in war. With war spring up vast camps for the active, and for the disabled large hospitals, sometimes in the field of canvas, sometimes far within the lines and more permanent. The moment active hostilities begin the medical officer assumes a new

* *Op. cit.* p. 371.

rôle. The officers of the ambulance service, who are line officers, are controlled by the medical director. The medical officers of the field hospitals are responsible through the Medical Department to the highest, not the lower authorities. The wounded on being wounded, officers or men, pass beyond their regimental authority and are not only cared for but controlled by the Medical Department, subject of course to the orders of the commanding general. The same is true of the sick once passing the regimental lines.

The latest writer upon the Army, a well-known and competent authority, says,* "an efficient medical officer must be a good quartermaster and a good commissary" in addition to being professionally skilful. A complete definition goes further, and requires him to be a good commanding officer. Medical officers in charge of general hospitals "are invested with all the prerogatives of commanding officers and will be obeyed and respected accordingly," and they are not subject to the orders of local commanders other than those of geographical divisions or departments (A. R. 1611). This command covers all officers of whatever grade, whether under treatment or attached for military or administrative purposes. Medical officers have in this way commanded hospitals of many hundred patients, with all their attendants, their guards of the line, and detailed quartermasters and subsistence officers. The command of an organized post with its full complement of line officers as a part of its machinery is a bagatelle beside that of the shifting current of units from half a hundred regiments, coming and going, with wants of all kinds to be supplied in addition to their efficient treatment. During the Civil War many hospitals were equivalent to brigades in the numbers involved. The corps that furnishes officers for such work need have no doubt of its own capacity. The line officers who witness that work are not the ones who raise any question as to the military status of the Medical Department. The management of those war hospitals was such that by common consent they became models for the world.

But some limit the meaning of "military" to "tactical" or "strategical," and are disposed to throw without the pale all who do not manœuvre battalions in the field; or who are not at least theoretical experts of the Art of War. They profess inability to understand how this so-called "non-combatant" can be a military

* General Merritt, *Harper's Magazine*, March, 1890, p. 498.

official. To quote from a paper written many years since: "These mistake the objects of war. They forget that the army is the great conservator of peace. They look upon slaughter as the end instead of one of the means. Were devastation of life and property the aim, they might be right. If the army of the republic were a collection of barbarians, it is conceivable the view our amiable citizens have taken might be the correct one. But war is an agent. It is carried on to terrify the enemy. When persuasion fails force, acting through fear and constraint, is employed: Men are killed as a means, in no sense an end. Whatever increases the efficiency—that is, the resisting and operating power—of the great agent of war, the army, is valuable and should form an integral part of it: Its killing capacity is measured by the manner it receives as well as administers blows; and the guardians of its physical health are no mean promoters of its efficiency. In proportion to this value does the medical officer become literally incorporated into the army—flesh of its flesh."* "Loyalty to truth, honor and authority, the observance of discipline for its own sake as well as for its results, the possession of that moral and physical courage that will carry a man who is right through death in any shape, but never near dishonor, are the essentials of a soldier, and whether he leads men to battle by word of command or inspires them to valor by his coolness he is equally worthy."†

It seems to me that after all the barrier, if there be a barrier, is very low, the boundary but ill-defined between officers of the line and those of the medical staff in everything excepting the matter of direct command. The lives of medical officers are spent where the troops of the line spend theirs, they go out and come in with them, share their pleasures and their privations, and, as far as identity of public interest goes, are at one with them.

Very little may be said on an occasion like this as to the strictly professional work done by the medical corps. Selected by an impartial examination, the most stringent of its kind in this country, although doubtless mistakes both in admissions and rejections are made, the fulness of their knowledge makes them thoroughly conscious of their deficiencies, as well as sure of their ground when it is secure under them. With an assured position

* *U. S. Service Magazine*, I. No. 5 (May, 1864), p. 480.

† *Ibid.* p. 481.

there is no temptation to use cases as capital, and as a rule the most meritorious men are the most reticent as to their work. It is hardly too much to say that case after case occurs in the seclusion of post hospitals, or in the isolation of garrison life, that in a civil community would lead to wide professional reputation and to wealth. There is not a post of any size where the medical officers have not constantly under consideration some serious problem involving health, if not life, that is only known to those not interested when art fails and death wins. This responsibility for life itself constantly overhangs the medical officer, who is not merely theoretically but literally always on duty. And it is a care that cannot be devolved upon another nor be lightened by general discussion. One condition that seriously detracts from his official prestige in a military community is the necessity for the medical officer's presence in the discharge of his duty. The panacea for other officers—to issue an order—will not compass the end; and in a society where the junior generally waits upon the senior, the obligation to reverse the procedure tends to diminish respect in unreflecting eyes. While the sometimes ill-considered requests, often delivered by discourteous servants or ill-mannered children in the form of commands, with that insistence of haste and aggravation of importance that such ignorant messengers frequently add, are trials that the most phlegmatic cannot always placidly endure. But these minor matters would have no value, did they not tend by their conspicuous and more common character to leave an impression upon military society greater than that made by the grave public duties discharged without publicity, and thus to bring the gratuitous family physician and general convenience theory more glaringly to the front.

As satisfactory in most respects as are the organization and interior management of the Medical Department, there remains possible progress whose discussion falls outside of such public lines as these. But there are three points for improvement that concern the Army at large where army public opinion could materially lend its aid. The first is the special instruction of the medical officer in his peculiar duties. There is little doubt that the newly-appointed medical officer will be found an intelligent physician and as little doubt that he finds himself in a society of whose special attributes he knows nothing. Unless he has the good fortune to serve with an experienced member of his own

corps who will take the trouble to carefully instruct him, and not merely make use of him to discharge distasteful and routine professional duties, he must acquire his technical knowledge by an experience that at first will lead him wrong quite as often as right. It frequently happens that he will be sent out alone with troops or, what is still more embarrassing, to the charge of a garrison. As a consequence it is a fact that, except within certain general lines, there are no absolutely uniform rules of conduct, and it is probable that in minor matters no two hospitals are conducted exactly alike. What is required is that every young appointee should be sent as a *supernumerary*, not for full responsibility, to a large post for instruction in matters outside of the profession of medicine. Or, which would be much more acceptable, that some large station should be set apart as a school of instruction in technical affairs, in the preparation of reports and papers, in the customs of the Service, written and unwritten, and in their personal carriage, including horsemanship. An outline of these matters in print is especially desirable for the sake of uniformity. In the British service after a candidate has passed his professional examination he is sent on probation to a school of that character conducted by medical officers, and he is not commissioned until he is further approved by them after fair instruction and trial in such duty.

The second point is the special disadvantage under which medical officers in service labor in their isolation. It is true of students as of society that "iron sharpeneth iron; so a man sharpeneth the countenance of his friend." Medicine is a progressive science, and those out of the current must be caught in the eddies and lose progress, or sometimes be stranded on the bars or entangled against the banks. The liberal supply of medical literature does not entirely replace observation and expert discussion. There should be provision, which could easily be arranged, for the compulsory attendance of the younger men, and the voluntary attendance of any one, at such a standard institution as, for instance, Johns Hopkins, for a post graduate course. Many medical officers do take such special courses as their time and means allow, but they do it at the sacrifice of their leaves and their official income, as well as by paying for the instruction obtained. This should be provided without expense to them, and they should prove their appreciation of its advantages by their reports and practical work. The infantry,

cavalry, artillery and engineers have their special schools. The medical corps deserves equal privileges, and the result would be to the advantage of the whole Service.

The third point is a practicable scheme for the elimination of the unworthy. The law provides that the grade of surgeon shall not be attained without a service of at least five years and an examination, and originally it was held that failure to pass the examination vacated the commission. But to protect the army at large from arbitrary dismissal, a general law now forbids any punitive loss of commission except by a court-martial. The consequence, unintentional but actual, is that there is no method by which an incompetent medical officer can be disposed of unless it may be by the action of a board that should wholly retire him, a procedure of doubtful expediency, and that certainly should not be employed as against medical officers, incompetents of the line being exempt. The only penalty now for failure to pass the examination is the loss of promotion. The deficient medical officer may remain an incubus forever, shorn only of his accession to the higher grade. To make matters worse, the present practice is to defer the examination to the latest possible period instead of, as has been the excellent custom, applying the test comparatively early in his career or about the time he acquires the rank of captain. As promotion in time of peace occurs between fifteen and twenty-five years, this delay is a decided drawback to the efficiency of the Department.

There is one other condition, supposed to be only temporary, but that has persisted for years, and affects the Army at large, but not as unfortunately as it does the Medical Department. That is the extreme difficulty found in retiring those physically disabled. This is less a question of promotion, as with the line, than of service. The numerous medical officers physically unable to discharge their appropriate duties represent so many vacancies, whose place for work must be filled by a corps already too weak for the demands of the Service. If an officer is permanently disabled his place must be filled. The line has numerous officers, who are substantially interchangeable, in each organization. The medical staff can only supply one vacancy by practically creating another. The remedy is well known and could easily be applied.

There is a matter of international concern, popularly regarded as a step toward the millennium, that in my judgment is wholly

unsuited in its present form to the United States Army, and whose influence upon the dignity of the medical corps is detrimental. This is the Geneva Convention, whose object is the neutrality of the sick and wounded, of the hospitals, and of the medical officers on the field. If this were limited to the time after the battle it would be less objectionable ; but to include, as I understand it does, the active operations, I believe is impracticable and would be disadvantageous if it could be carried out. It is unnecessary, for no civilized enemy will fire upon hospitals, knowing them to be such, if it can be avoided, unless under the moral certainty that they are used as aggressive bases ; nor will he interfere with the professional work of the medical corps. With an uncivilized enemy no such conventions can be executed. The only effect is conspicuously to brand a medical officer as substantially a military eunuch, to deprive him of active co-operation but not to lessen in any appreciable degree his peril in the field. The medical officers who are under artillery fire will not be protected by a white cloth with a red cross on their arms. Long range small arms have no respect for persons. The protection afforded is purely imaginary. But the restraining influence may be serious. It may be and often is the duty of a medical director and a medical inspector to ride freely over the field at the beginning of a battle. White, the medical director of the Sixth Corps, was with the general and his staff when shot at Antietam.* Suppose that he had been recognized as a medical officer, and therefore had not been fired upon ; but suppose, further, that from his proximity to the enemy he had discovered him, was he not to warn his general and his comrades? Still that would have been a violation of neutrality, and more had he been able to compass the capture or destruction of the foe. If any man is so clothed as to be protected by international law decent reciprocity requires his actual neutrality. In that case his own army can have no advantage of his presence in any combatant sense. But, exceptionally, such service may be very important. The local knowledge of a medical officer made him a guide in a turning movement in Virginia. I have seen a broken line of battle restored, in part, by a medical officer ; prisoners have been taken by them, and aides' duties frequently and efficiently performed under fire. I think no medical officer of the United States wishes to clothe himself in a garb of immunity, that at best is like the Persian monarch's

* Brown, "The Medical Department of the Army," p. 228.

invisible robe of innocence, and to allow his fellows to fight it out as best they may without contributing his share, however unimportant, toward the victory. For myself, and I suspect I am not alone, I desire no place under the Geneva flag except as it points the way to a haven of succor.

It is to be inferred from this paper that, for one, I am dissatisfied with the nomenclature and with the presumed limitations of the Medical Department. Surgeons and assistant surgeons are pseudonyms, not descriptive titles. Even in war the sick vastly outnumber those who require surgical aid. An assistant surgeon rarely assists, excepting at the very inception of his career, and it is absurd to characterize by such a designation a man of forty years or more, long in independent charge. The medical officers are medical officers, neither more nor less, and should be so denominated. In my judgment, and it is no hasty opinion, but the result of many years' experience and reflection, the Department should be organized with a certain number of lieutenants, captains, majors, lieutenant-colonels, and colonels in the medical corps, as in the engineers and ordnance. Spasmodic efforts have been made to engraft upon the higher grades such titles as deputy surgeons-general and assistant surgeons-general, as in the Quartermaster's and Pay Departments. These are misnomers and out of place. However suitable for the supply departments, which I do not pretend to determine, these titles would add no dignity and define no function beyond those of Lieutenant-Colonel and Colonel, Medical Corps, distinctions that could only be acquired by service and be worn by merit and that have no such limitations as the one-sided and incomplete "surgeon" implies.

With a chief of the corps selected for his learning in science, experience in the field and tried administrative faculty, and its ranks do not lack such men, with officers standing on a well-defined legal platform of equality with the staff at large, and with its history of faithful and conspicuous service alongside the line wherever the line itself is found, the future of this branch of the Army will be even more auspicious than its past has been prosperous.*

* For discussion on this paper see "Comment and Criticism."

THE FIFTH CORPS AMBULANCE TRAIN, 1864.

By LIEUT.-COL. W. F. DRUM, U. S. A.,

TWELFTH INFANTRY.

HAVING been honored by a request from our enterprising Recorder, to read a paper before this Commandery,* the question naturally arose, what is there in my experience that would be interesting? I have finally ventured to write a brief account of the management and operations of the Fifth Corps Ambulance Train, during the Virginia Campaign in the spring and summer of 1864, and hope it will be acceptable.

It is comparatively a new field, but little having been written of the work done by the brave and faithful men who carried stretchers instead of rifles.

I was detailed Chief Ambulance Officer of the 5th Army Corps, Army of the Potomac, in February, 1864, and at once ordered to make a careful inspection of the train, report its condition and make necessary requisitions for supplies to put it in complete order for the coming campaign.

The 5th Corps at that time extended along the Orange and Alexandria Railroad, from Manassas Junction to Rappahannock Station, and the ambulance train was much scattered, a few ambulances and wagons being kept at each brigade headquarters. It was found that much labor and material were necessary to put the train in condition for field work.

In March, 1864, a law was passed for the organization of the Ambulance Corps, which law also fixes severe penalties for the improper use of ambulances. For the passage of this law, the Army was largely indebted to the efforts of that good friend of the soldier, the Hon. Henry Wilson, of Massachusetts.

About that time, General G. K. Warren succeeded General George Sykes (relieved on account of ill-health) in the command of the 5th Army Corps, and he was directed to concentrate his Corps in the vicinity of Culpepper Court House. The ambulance train was then assembled and the work on it pushed for-

* Read before Minn. Commandery, M. O. L. L., U. S.

ward with energy, the harness was overhauled, ambulances and wagons thoroughly repaired and repainted, and the necessary animals obtained, so that by the 1st of May the train was ready for the field, with extra parts lashed to each ambulance and wagon. It was also found necessary to make some changes in the personnel. All who were found to be inefficient were relieved and others detailed. In making these details effort was made to obtain men who possessed good soldierly qualities. In this matter I was greatly assisted by Colonel (now Brevet Brigadier-General) F. T. Locke, Adjutant-General of the 5th Army Corps.

On the 1st day of May, 1864, the 5th Corps Ambulance Corps and Train, as organized under the new law referred to, consisted of seventeen commissioned officers of the line, five hundred and fifty enlisted men, one hundred and seventy-one two-horse ambulances, sixty-two army wagons, for quartermaster and hospital supplies, eleven medicine wagons, five hundred and twenty-eight horses, and three hundred and forty-eight mules.

This strength was slightly increased before June 30th, by reason of new organizations joining the 5th Corps. Surgeon (now Brevet Brigadier-General) John J. Milhau, Medical Director of the Corps, was the head and had supervision over the Medical Department and Ambulance Corps. A captain of the line was detailed as commander of the corps, and styled Chief Ambulance Officer. A 1st lieutenant was detailed for each Division, who was also quartermaster and commissary for that portion of the train, and a 2d lieutenant was detailed in each brigade. One sergeant was detailed from each regiment and three privates for each ambulance to which the regiment was entitled (one driver, and two stretcher bearers). To each regiment of infantry of 500 men or more, three ambulances were allowed; for 200 and less than 500, two ambulances, and for less than 200, one ambulance. Two to each regiment of cavalry of 500 men or more, and one to each regiment of less than 500, and one to each battery of artillery.

The line officers referred to received strict orders to assist and co-operate with the officers of the Medical Corps. They were also instructed to assist all sick and wounded men who came within their reach, without reference to the corps, division or brigade to which they might belong. In case an ambulance broke down on the march it was pulled out of the road, and the

broken parts replaced in a few minutes, or if too badly injured to be so repaired, it was at once wrecked and all detachable parts were tied on the other ambulances for future use. By this course only four ambulances were lost in May and June, although many wheels and other parts were broken. On going into camp the trains were parked as near the division hospitals as practicable, and such details of ambulances as were needed reported to the surgeons in charge. The horses and mules were shod and all necessary repairing done as soon as possible. Every opportunity was taken advantage of to obtain the necessary supplies and animals, and, when practicable, weekly inspections were made of all pertaining to the camps and trains. Before an engagement, all stretcher bearers were ordered to their regiments; afterward, when the wounded had been taken from the field to the hospital, the bearers were sent back to assist in loading them in wagons, to be taken to the nearest depot or boat landing, and sent north. This work was generally done at night. As ambulances could not always be spared from the front, the wagons that brought rations to the Army were used in sending the wounded back to the depot. Each wagon was first nearly filled with small pine boughs, and then covered with blankets, forming a mattress, on which the wounded would ride with as little discomfort as in the ambulances with their stiff springs, which is not saying much, for there is no comfort for a wounded man in a wagon strong enough for field service and on rough roads, except in the feeling that he is being taken where he will be well cared for and made as comfortable as possible. It has been said, and I believe with truth, that it is a very brave man with a high sense of duty who willingly goes under fire without arms. When we remove from a man the power to strike back, we take away that element of pugnacity which is a great support in time of danger. The officers and men of the Ambulance Corps did all in their power to find the wounded and remove them to the hospitals, but it is not strange, however lamentable, that on a field as rough as that fought over by the Army of the Potomac in May, 1864, and with lines constantly changing position, that many of our brave men were never taken off, and that some of them were probably burned by the fires that started in the thickets.

The largest regiments were only allowed six men for that work, and as they could only carry off three badly wounded men at a

time, it will be seen that they would have to make many trips if the loss was heavy, from the line back to the nearest surgeon. Many wounded men were fortunately able to walk a short distance, and others were assisted by their comrades. One object of the Ambulance Law was to obviate the necessity of men leaving the ranks, and all unwounded men were sent back to their commands on reaching the ambulances. It was found not practicable to concentrate the stretcher-men, as were the ambulances, on that part of the line which suffered most.

When the 5th Corps was detached on the 18th of August, 1864, to operate on the Weldon Railroad, but limited hospital accommodations were taken, and the principal hospital was maintained nearer Petersburg. The enemy, on the afternoon of the 19th of August, penetrated some distance between the 5th Corps and the rest of the Army, and in making the necessary detour a train of wounded that night were obliged to pass through fields made very soft by the heavy rains, and unfortunately got into quicksand; the ambulances sank almost to the boxes, and the horses got down so that they had to be unharnessed and led out to solid ground. The men, leg deep in mud and water, pulled the ambulances out by hand. It was nearly morning when the train finally reached the road to the hospital. Nothing but a strong sense of duty and sympathy for the sufferers in the ambulances could have induced men to work as those men did that night. The wounded suffered from the delay, but it was unavoidable. On one occasion a stretcher man did good service in assisting to stop a stampede. Near Spottsylvania Court House a brigade was seized with one of those senseless and unaccountable panics which would sometimes occur, and while efforts were being made to stop the crowd as they came back, I noticed a large man near me holding a stretcher by one end and swinging it vigorously, stopping very effectually all he could hit. After the excitement was somewhat over he came up to me and whispered (for he had lost his voice in some way), "Captain, wouldn't I give it to them if I could only talk."

As an exhibition of good nerve, at the Weldon Railroad it was necessary to park the ambulance for a time, under fire, and although the shells came uncomfortably close, each driver kept his team in place and the line well dressed, until ordered to move out. Some of the drivers looked very white, but they stayed there.

In the fall of 1864, I was told by a medical officer of the 5th Corps that a larger percentage of the wounded had died in hospital than in campaigns earlier in the War. While at first glance that appears to detract from the reputation of the surgeons, it was really due to the fact that more desperately wounded men reached the hospital alive, and it follows that some were probably saved who in former campaigns would have died on the field. A few extracts from reports will show the work accomplished:

EXTRACTS FROM REPORTS OF CHIEF AMBULANCE OFFICER FOR
MAY AND JUNE, 1864.

* * * * *

In all the battles in which the 5th Army Corps has been engaged, the principle in the management of the train has been the same—that is, the ambulances have been sent where they were most needed, without reference to any particular Division; if any one of the Divisions, as was frequently the case, suffered much more than the others, the majority of the ambulances in the Corps were used in transporting the wounded of that Division to the hospital. At the beginning of a battle, the whole train of ambulances was generally parked at some central point, in charge of an officer. A few ambulances were then sent as near as possible to the line of battle of each Division; in that way but few were exposed to fire at one time, and the stretcher men had but a short distance to carry the wounded. As fast as the ambulances at the front were loaded and sent to the hospital the officer in charge of the main park would send others to take their places, in this way placing the whole train at the disposal of the Division most in need. In the disposition of the officers, one, as stated before, was placed in charge of the main park, one or two superintended the loading at each Division, and the remainder superintended the removal from the field to the ambulances. It was sometimes necessary to have an officer at the hospital to expedite the unloading and return the ambulances to the main park.

By managing the train in the manner explained it is believed that the wounded were removed more expeditiously than they could have been in any other way with the means at hand. During the campaign, the ambulance train of the 5th

Corps removed nearly eight thousand wounded men from the following fields to the hospitals, viz.:

| | | |
|-------------------------|---------|------|
| The Wilderness, | - - - - | 1800 |
| Laurel Hill, | - - - - | 3000 |
| Spottsylvania, | - - - - | 300 |
| North Anna, | - - - - | 180 |
| Brockinbrough's House, | - - - - | 525 |
| Bethesda Church, | - - - - | 680 |
| In front of Petersburg, | - - - - | 1500 |

7985

The train also assisted in transporting the same number of wounded, and over one thousand sick from the hospitals to be sent North.

* * * * *

While in the performance of their duties six stretcher bearers were killed; one officer, four sergeants and seventeen stretcher bearers were wounded. Three sergeants and nine stretcher bearers were taken prisoners. Total casualties in Ambulance Corps for May and June, 39.

* * * * *

The train started with ten days' grain for each animal, afterwards grain was drawn, whenever we were within reach of a depot, and care taken to obtain forage from the country, by this means ambulance officers managed to keep grain on hand, but were not able at all times to feed the full rations. Owing to the severe work the animals became much reduced in flesh and many were entirely broken down. Eight horses were killed or wounded in action; 34 horses and 26 mules died; 2 horses were stolen; 3 horses were captured; 39 horses and 16 mules were broken down and turned into depot.

* * * * *

There were 872 ambulance and 766 army wagon loads of wounded sent to depot from the corps hospitals.

* * * * *

I have no memorandum by which I can show the number of sick and wounded taken from the intrenchments in front of Petersburg to the hospital and thence to City Point for shipment North, between July 1st and August 18, 1864, but the number must have been considerable, for I doubt if a day passed without casualties on that part of the line.

EXTRACTS FROM REPORT OF CHIEF AMBULANCE OFFICERS, 5TH ARMY CORPS, FOR THE 18TH, 19 AND 21ST OF AUGUST, 1864.

* * * * *

During the three days' fighting, the ambulances conveyed from the field of battle to the hospitals of the Corps, seven hundred and seventy-three of our own wounded; thirty of the 9th Corps, and one hundred and fifty-three of the enemy; besides about three hundred sick.

* * * * *

Great credit is due the officers and men for the untiring energy with which they worked day and night, in the rain and mud, in order to transport the wounded back to the hospitals as quickly as possible.

* * * * *

Two sergeants were killed; one sergeant and five stretcher men wounded; and nineteen stretcher men taken prisoners,—the total number of casualties for the three days, in the ambulance corps, twenty-seven.

Eight horses were killed and some of the ambulances were damaged by shells.

* * * * *

Being a daily witness of the work of the surgeons, which was intimately connected with the Ambulance Corps, it is proper I should say a word in regard to them.

During the terrible campaign, referred to in this paper, it would be difficult for a person not then present, to form a correct estimate of the great amount of professional work rendered by this very deserving class of officers. They frequently performed their duty under circumstances of great personal danger, and during and after an engagement they worked with but little rest, day and night, to save life and relieve from pain the gallant men who came under their care during that prolonged struggle.

Reprints and Translations.

STRATEGY AND MILITARY LEADERSHIP.*

BY MAJOR KEIM, GENERAL STAFF.

Instructor at the War Academy.

Translated by JOHN P. WISSE, 1st Lieutenant 1st Artillery.

(By permission of the German publishers, Meissner, Mittler & Sohn.)

If it were possible to permit one of the most illustrious leaders of the beginning of this century, Duke Ferdinand of Brunswick, to inspect the German plan of operations for the War of 1870, the Duke would find little satisfaction in a plan of campaign, according to the views of his time, so thoroughly unscientific and inadequate. He will probably conceive a very unfavorable opinion of the Prussian General Staff, because there is no mention whatever in this plan of strategical points of support or key points, of strategical feints or strategical reserves, of positions or fortifications or magazines, of demonstrations or castleings or other learned things, but in their stead we hear in very plain words of the enemy, of a decisive battle to be contested with all available means. And if it were possible to have the greatest Prussian tactician of that time, General Von Saldern, as a spectator at the field exercises in battle tactics of a Prussian brigade he would no doubt sadly shake his head over this deterioration, this decay of tactics, over this complete lack of the finer comprehension of true tactical art, which certainly, according to the prevailing ideas, consisted principally in permitting the genius for drill to shine in complex forms, in the attack *en échelons*, in the advance *en échiquier*, in the ingenious withdrawal of the separate lines of battle in the retreat.

We again, on the contrary, throw aside entirely to-day these precepts and views on strategy and tactics, convinced that they are entirely false, appearing to us opposed to the very nature of war—with no certainty, to be sure, as to how our method of teaching the Art of War and the military leaders of our time will be judged at the end of the next century. We naturally hope that this judgment will be favorable. I have selected the following pictures to show what great changes our ideas in regard to war, in regard to the battle even, are subject to in the course of a comparatively short space of time. Our comrade in the army sums up this matter—after a little experience and in an unkind spirit of criticism—in the characteristic words:

"The Art of War is changeable," and if we give this brother officer Berenhorst's work, "Thoughts on the Art of War," to read, in which book

* A lecture delivered to the Military Association of Berlin on the 12th of December, 1888.

the author attempts in an ingenious way to show that in war everything is determined by accident, he will be inclined to have a very poor opinion of the Art of War. If, in addition, he become convinced that a talent for war is in-born and cannot be learned, that practice is, moreover, the only practicable method, theory, on the other hand, a myth, he will be strengthened in his view that it is not worth the trouble to occupy himself more thoroughly with learning the Art of War. And yet this is a most deceptive, unwarranted and hazardous conclusion. War one cannot learn, nor can it be taught in the abstract, and in a certain sense the Art of War is indeed changeable, but changeable are mainly the mechanical, material parts, *i. e.*, the means for carrying on war are changeable. On the other hand, forever unchangeable remain the elements of time and space, quite unchangeable, at least as a whole, remains the earth's surface on which we carry on war, and finally forever unaltered remains the principal element in war, man with his faults and virtues, with his feelings and inclinations, with his brave or timorous heart.

These unalterable factors permit of the founding of a *Science of War* based on military history, the study of which, the ingenious application of which, form and will ever form the ground-work of the *Art of War*.

A mass of interesting relations, mutual reactions between strategy and the Art of War, may be developed. But I will avoid all abstract discussion, partly because to the soldier, even to the German soldier—in spite of the fact that he belongs to a people to whom the philosophic tendency of thought specially pertains—abstraction is not sympathetic, I will endeavor to connect my views directly with the active, the living, *i. e.*, I will select military history and its lessons as the connecting link between strategy and the Art of War—military history, which is and ever will be, in all that relates to war, an incorruptible and indispensable advisor.

It is very remarkable that the leadership of Frederick the Great exercised such a slight influence on the Science of War in his day. This phenomenon would be explained in the simplest way by adopting the view that the leadership of the great king was not an outgrowth of the teaching, the conception of war of that time. This view was maintained indeed by those who represented Frederick the Great as a *virtuoso*, not as a leader highly gifted, with a characteristic comprehension of war. This misconception of the qualities of the great king as a leader will be at once recognized as such if we hold to the actions of the king, to the entire art and method in which he acted in war, and not to particular expressions of his, or to separate campaigns, which at the beginning of his military career he voluntarily conducted in the spirit of the methodical mode of troop-leading, or which later on he was compelled to conduct in this spirit by the force of circumstances. That this estimation of him is false is proven, however, most strikingly by the fact that the most note-worthy representatives of the instruction in the Science of War of that day, the true *virtuosos* of the methodical system of conducting war, such as Prince Henry and his followers, were the very ones who passed unfavorable judgment on the king's leadership. They were therefore convinced that the generalship of the royal leader did not correspond to that system of strategy in which they saw embodied the sum of all strategi-

cal wisdom. They looked upon the king as a kind of lucky empiric, but not as initiated into the true, *i. e.*, the learned, pedantic, scientific mode of troop-leading as it was known and taught in those days.

Indeed, in this way only can we explain the fact that the true spirit of his generalship was not grasped by those who took part in the campaigns of Frederick the Great, but that long years passed by before the Art of War of the royal leader found complete vindication. But foremost of all was it the *practical* men who did not know what to do with the *spirit* of Frederick the Great's leadership and held all the more tenaciously, therefore, to the *forms* thereof—even after these forms had grown old and useless. They talked continually of Frederick the Great, but they did not think, teach or act in his spirit.

Although arguments may be advanced in explanation and excuse of the fact that the Science of War of that time considered so little of the leadership of Frederick worth learning, and assertions made to the effect that these methodical methods of troop-leading had always been good enough, yet these arguments fall when we remember that in the wars of the French Republic successes, I mean ultimate military successes of the allies, who had proceeded according to the teachings of the methodical method of troop-leading, were so completely and conspicuously wanting.

Men were so entirely convinced of the truth and infallibility of these teachings and of the scientific correctness of this method of troop-leading, that, in spite of all the military experience to the contrary, they could acquire no other view. The cause of the disasters was sought for principally in extraneous mechanical things. In the numerical superiority of the French, in the system of skirmishing and of requisition, in the good luck of particular leaders, in the difficulties of commanding the allied troops. Strange to say, however, the mechanical advantages of the French in these respects were not imitated—they kept up the linear tactics and the mode of supply by magazines, the poor arms and the defective system of recruitment, at least in Prussia—but in addition, they preserved the old theory of the Art of War, now for the first time coming to grief in the reality of war. The latter was regarded as a *noli me tangere*.

And yet it would have been so easy to find explanation of the French superiority and the causes of our own disasters, had we not become so deeply prejudiced, so utterly incapable of being taught. The causes consisted mainly in that little by little new elements had arisen in the Art of War, in that these new elements rested mainly on an intellectual basis, partly on a moral only; for the Prussian and Austrian armies were superior to the French army in respect to the training and formal instruction of the men. This is perfectly evident from all that is known of the inner relations of the French army. This intellectual superiority, however, rests mainly on the fact that the intelligence, the knowledge of the French army had been emancipated, that the rigid one-sided Science of War, the method of routine, was departed from, and in its stead larger views, corresponding to the new relations, were allowed to appear and to take their place. French strategy began to be imbued with the true spirit of war, it did not inquire after the kind of system nor after its origin, but set up for itself a high

ideal, with high aims, which it endeavored to attain by energy, by restless perseverance, by rapid and intelligent utilization of time and space.

In the first campaign the strategical knowledge of the allies lasted them up to Valmy—up to that point the military means on hand had been properly set in motion. But when it became necessary to correctly utilize these means, *i. e.*, to bring about a decisive action, the art of strategy was not equal to the task because its teachings declared the avoidance of a tactically decisive action as relatively the best course to be pursued. The leadership at Valmy had lost self-confidence—the worst thing that can happen in war—because it was left in the lurch by the teachings of the Science of War.

In the succeeding campaigns the plans of operation of the allies became more and more complex, more and more learned, more and more comprehensive; those of the French, on the contrary, continually simpler and clearer. The military plan of Mack for the campaign of 1794 in the Netherlands, regarded in his time as a masterpiece, may be taken as an example of the startling military theory of that day, supposing him opposed to an enterprising enemy; it corresponds almost to the art and method in which the wars of the Spanish succession were conducted.

While with the allies everything was carefully prescribed, ordered, paragraphed; the higher French authorities adopted more and more the principle of giving only general directions, of requiring self-reliance in the generals, and keeping in view the whole rather than going too much into detail. The adversaries of the French carried on war more bureaucratically—systematically. They had no independence of spirit, and this lack of self-reliance was characteristic not only of the higher leaders, but was to be found in all grades of the military hierarchy, and even had the higher commanders of the army imitated the system of the French and required more independence, it probably would have been without effect. This self-reliance cannot be ordered on the spur of the moment, it must be inculcated in time of peace, it cannot be learned mechanically, but must be spiritually acquired! This training, however, they lacked, because it was not in sympathy with the methodical, mechanical character of the Science of War and battle tactics.

Frederick the Great often complained—occasionally in very energetic terms—of the intellectual heaviness of his generals, of their lack of self-reliance; he complained because he had to order and arrange everything himself, that he had really but few generals. We will not go deeper into this subject and determine in how far Frederick is himself to blame for this state of affairs, but must hold the entire system responsible therefor, and, even if it must be conceded that after the glorious results of the Seven Years' War, no attempt was made to alter this system before 1792, the experiences of the French wars of Revolution must still, of necessity, have led to reflection, criticism and comparison. That this took place only in very narrow circles and in no way led to change a false system, to shake a harmful method of instruction, is a proof of the often pernicious power of habit, of tradition, of routine.

But there were also elements of an ethical nature which were to the advantage of the leadership of the French. Love of country, patriotism,

even political fanaticism, were the moving springs for extraordinary efforts and actions, while on the adversaries' side it was considered contrary to prescribed form, even unmilitary, to think of calculating with such factors. It was commonly believed that this could, to a great extent, be replaced by the drill-stick. Even the composition of the armies left little play for either moral or ethical influences; moreover, such violently active elements did not at all fit into the war system in use. The latter required a pedantic, easy and comfortable leadership, disinclined to anything out of the ordinary course; whereas an army, in which, through the system of universal military service, the impulse for decisive blows would naturally make itself felt, would have rendered such a war system useless.

The element, however, which contributed most effectively to the success of the French arms, was the energy in the leadership, the offensive, which was set up as the highest principle. Both the energy of leadership and the offensive had, however, become for the Science of War of the time, and therefore also for the leadership, empty conceptions. Soor, Hohenfriedberg, Rossbach and Leuthen had been long ago forgotten, quite as completely as if these battles had been fought many hundred years ago. But not only had the essence of the offensive been forgotten, but men had also forgotten to take hold energetically in war, without hesitation and regardless of consequences to themselves or others. Men had forgotten that Frederick the Great did not spare his own brother, that he gave Prince Leopold of Dessau a dressing down, and called his attention to the fact that he would have to answer for the result with his head. The French government, as is well known, had many generals, who did not know how to be victorious, guillotined. And although this mode of procedure may not be approved of, it was nevertheless the expression of an unalterable determination to be victorious under all circumstances. But when such a determination, whether emanating from the higher authorities or from the masses—that is a matter of indifference—makes itself felt, the energy of the leadership is secured.

How entirely different is all this on the side of the allies. A certain aristocratic silence, a proud contempt for these young and inexperienced—much stress was laid upon this point—*sans-culotte* generals gives the coloring here. And what indulgence for their own errors and mishaps. Every defeat which they experienced was palliated, every success exaggerated. They consoled themselves in the authoritative circles by saying that the French, seen in their true light, were victorious in a very unscientific way, contrary to all the laws of the Art of War. Meanwhile they lost one campaign after another, one province of German land after another, so that they were soon limited to the right bank of the Rhine. Of course, the successes of Clerfayt, of the Archduke Charles, are bright pages in the history of that time, and several of the larger combats brought at least honor to the Prussian arms—but the leadership as a whole was not touched thereby, otherwise there could have been no campaigns of 1805 and 1806, otherwise the Duke of Brunswick would not have been regarded in Germany at the end of the century as the greatest of all living generals.

Even the appearance of Napoleon and his great successes were not suf-

ficient to make apparent to the authoritative circles of Germany the superannuated, the defective, in the Science of War of that day. In Austria, perhaps even more than in Prussia, was this surprising, because there they found out by personal experience whither the holding on to the principles of an antiquated war system led. Even the theoretical men of that time, the speedy flight of which should have stirred up their spirits to activity, they had indeed some dark foreboding of the insufficiency of their military teachings, but when required to make the new phases in the Art of War useful to the Science of War and available in its instruction they were lost. Berenhorst tore down without building up anything useful. Bülow applied a comparatively great critical ability to no useful purpose in developing in his main work "the spirit of the modern system of war," a mathematically abstract science, teaching the excellence of eccentric lines of retreat, to be suddenly changed to concentric lines of attack, a system of which only the *termini technici* have formed practical application, and have indeed passed into military usage. A Science of War, in any way practicable, that long period of great battles did not mature. On the whole we stood at the end as at the beginning, scientifically at the tail end in strategy and tactics. Jomini alone, in his outline of strategy, which, founded as it was on the campaigns of Frederick the Great and the leadership of Napoleon, presented a new system of instruction, constituted an exception to the general rule.

As to this leadership of Napoleon's it must be admitted without reserve not only that it constitutes a decisive turning point in the art of conducting war, but also that it gave the impulse to and furnished the ground-work for the modern Science of War. Granting this, I would nevertheless like to call attention to various phases which may perhaps serve to limit somewhat the commonly received opinion, founded on his personal genius alone, of the wonderful generalship of Napoleon. In the first place we must remember that the material foundations for Napoleon's successes—as such we regard an improved tactics, an appropriate organization of the army and a perfected system of requisition—that all these things had been introduced into the French army many years before, and that the credit of this introduction belongs not to Napoleon, but to the "organizer of victory," Carnot.

Moreover, even the strategical and tactical principles of Napoleon, which we are accustomed to regard as the basis of his leadership, did not spring directly and perfect from his brain,—as Pallas Athene from the head of Zeus—as his enthusiastic admirers would have us believe. The Science of War as well as the Art of War develops historically—without any violent bounds, and particularly in the great commanders are the effects of earnest scientific study and intelligent application most evident. It was not Napoleon who first attempted to carry out practically the idea of concentrating strategically superior forces on the decisive points—this principle Carnot had already attempted to carry into effect—nor was it Napoleon who first carried out the idea of bringing about the tactical decision in a battle by an attack massed on a particular point of the line of battle—centre or wing. That Hannibal and Cæsar had done, and in a masterly way Frederick the Great in those measures of his which have since been designated the oblique order

of battle. This "concentration of masses" of Napoleon, as well in a strategical as in a tactical sense, has been stamped a philosopher's stone in the Science of War, an *arcane* of victory. But by so doing men have rendered poor service to the military genius of Napoleon, and erred even as did they who thought they must discover in every battle of Frederick the Great a form of the oblique order of battle, or they who see the foundation of the German victories of 1866 and 1870 in the "divided" strategic advance and the system of operating on exterior lines. Such views are not very complimentary to commanders because they attribute to them a kind of narrow-mindedness, a power to act only according to definitely prescribed methods. Moreover, poor service is hereby rendered to the Science of War and poorer still to the Art of War, because in this way we most certainly adopt strategical and tactical models which do not conform to the true spirit of war.

Napoleon's merit consists mainly in that he broke away more fundamentally than had been done in the campaigns of 1792 to 1796, either on the part of the French or on the part of the Austrians, from the antiquated theories of troop-leading. His merit consists in that he made the *offensive* his rule of conduct and thereby restored the *spiritual as well as moral elements to predominance in leadership*; these had been forced into the background by the mechanical character which the Science of War had assumed. But his qualities shine most brilliantly perhaps in his measures to reap the rewards of victory, in his strategical pursuit, which, however, also find counterparts in military history, in Cromwell, for instance.

Moreover, it must not be forgotten that Napoleon, like Prince Eugene, like Frederick the Great, like Archduke Charles, and like all other prominent generals of recent times, was extremely diligent, eager after knowledge, and interested in all scientific studies. It is well known how, according to his own account, he studied, worked in the camp as in the cabinet, in order to add to his store of theoretical knowledge. It is well known what a high value he placed on the zealous study of military history, although himself a typical practical man. Providence does not throw successes into the lap of any mortal man; they can only be won by struggling, battling, striving and working, and the most prominent military men are just the ones who have almost without exception acquired the intellectual foundations for their deeds in war in the quiet of the study. Again—referring particularly to Napoleon's campaign of 1796 in Italy—it has lately been shown that the leading thought of this campaign did not proceed directly out of Napoleon's brain, but that an historical basis, derived from campaigns which had been enacted under similar relations on the same ground as that of 1796—that this basis, founded on general knowledge, exercised a decided effect on the end and aim of Napoleon's mode of action.

With this preponderance of intellectual training, founded on scientific study, of Napoleon—who is *par excellence* the representative of learned military leaders—accords also the fact that, with one or two exceptions, he did not find among his generals any special school, that these generals were useful only when they received orders and instructions from him personally. He had the same trouble with his generals that Frederick the Great experienced. These generals had become great only in routine work; they were neither,

scientifically nor intellectually, sufficiently well instructed to be able to act independently and confidently beyond a limited range. The necessary qualities of character, for this the generals of Napoleon as well as those of Frederick the Great, possessed in sufficient measure—they were brave men, experienced in war and with great decision of character—but character alone cannot accomplish the desired result; that alone is not sufficient without the assistance of clearness of mind and quickness and accuracy of thought, to enable men in critical moments to hit upon the *correct and proper* in war.

But while Napoleon was uninterruptedly directing his efforts towards giving expression, even in time of peace, in the organization and training of the army, to the teachings of war recognized by him as correct, *i. e.*, the instruction of the army tactically, we find in Germany the wretched picture of a self-satisfied mode of instruction in the Art of War, a holding fast to antiquated theories. One gets the impression that the important events transpiring and wars that were shaking empires had been entirely overlooked by the military world. But such could certainly not have been the case, for the renown of the French arms and the victories of Napoleon were undeniable facts. They, however, who were in a position to raise their voices and demand a change from the methods thus far followed of a system of warfare no longer adequate and quite antiquated; they who should have introduced another mode of instruction of the troops preparatory for battle—these remained silent, and expressed their conviction of the excellence of their Art of War. They desired neither to learn nor to forget. As pride goes before a fall, not only in case of individuals but also with peoples and armies, so they began already, by the power of tradition alone, to believe themselves a match for this "Bonaparte," as he was commonly called.

While this "Bonaparte" was entering upon one of his most brilliant campaigns, that of 1805, and bringing the full force of the lightning power of his leadership to bear with annihilating effect, men in Berlin were talking and writing about the powerful effect of strategical manoeuvre, discussing among other things the effect of a Prussian army in Thüringen on the French operating on the Danube. While Napoleon in the camp of Boulogne was unremittingly and systematically *preparing* his troops for war, for fighting, in Germany they were drilling with the square and astrolabe, practising things that in peace could be dispensed with and in war could not be used. While Napoleon in the battle of Austerlitz was fighting one of his finest battles by the power of the shock of columns, they were practising in Germany on the drill-ground the most complex attacks in long thin lines, and considered it the sublimest height of tactics to outflank the enemy *en échelons*, and to fight with comparatively shallow lines.

Strategy as well as battle tactics had become a parody. They believed, without considering the complete change of conditions and means, that they might live on the mere shadow of the art of troop-leading, because this shadow had been formerly redeemed by victories. Strategy as well as tactics had lost touch with the living factors of the art of leadership, with the experiences and teachings of war itself. They were forever talking about practice, but what they meant thereby was, when properly viewed

practice on the drill-ground—living practice, war and its lessons, was held by these practical men as of little worth. The new form of strategy did not fit into the prevailing system—it would have been very uncomfortable to get accustomed to new modes of thought, to become familiar with new forms. Exceptional men there were, to be sure, who were of the opinion that we should nevertheless advance and improve and adopt the good methods of the French victors. But such men were looked upon as "revolutionists," who had no conception of the true war system.

With the strategy itself, with the official views on strategy and tactics, even men like Scharnhorst hardly dared at that time to meddle, so biased were even enlightened souls in regard to that which had been taught them as the Science of War.

In this Science of War—and herein lies one of the main explanations of the astonishing fact that men undoubtedly highly gifted held so tenaciously to the methodical and mechanical view of war—the higher military geography played an important part. So did fortification, considered in its relations to strategy.

Military geography is undoubtedly a most important and useful science, but it can easily lead to error if its possible effect on strategy be exaggerated—just as topography is unfavorable in its action when tactics pays too much attention to it.

Had the teachings of military geography always prevailed, military history would not have the crossings of the Alps by Hannibal, Suwarro and Napoleon, nor the campaign of the Russians in China, to recount. But men clung with outspoken affection to this military geography, because, hallored by custom, it constituted the principal part of higher strategy, even as the proper use of the ground for fortifications constitutes the principal part of lower strategy. These were the times of impregnable positions, these were the times when the conceptions of strategical curtains and strategical flanks created disorder and havoc. These views disappear from the Art of War after the year 1806, but very gradually; in the plans of operation military geography, to satisfy a weakness for positions and so-called strategical points (I need only call attention to the part played by the plateau of Langres in the campaign of 1814), helped more than was to be desired, even up to recent times often, to draw the eyes of the commander-in-chief away from the main point, that is, from the enemy. The bitter satire with which the founder of modern ballistics, William v. Ploennies in, his charming book: "Life of General Leberecht vom Knopfe," treats this geographical strategy, in causing all the strategical lines of the continent to meet on the drill-ground of Winkelkram, and making them thereby command all conceivable lines of operation, has a background of earnest reality in the scientific excrescences of a mechanical strategy.

As the Prussian army entered on the War of 1806, its views were still based on those of the methodical mode of conducting war, even as regards the battle. In consequence of a headstrong persistence in holding on to a theory which had become useless, it was not equal to the task which the practice of war had set it. The Prussian army with such schooling, which placed the platoon leader as well as the commander-in-chief in a false posi-

tion, could not win victory from a Napoleon. The immediate causes, the influences of a political, personal or mechanical character, Clausewitz has pointed out in so masterly and convincing a manner in his work, "An Account of Prussia in her Humiliation," just issued by the General Staff, that I will not tarry over that unfortunate time. On the battle-fields of Jena and Auerstädt a system of strategy and an art of war fell to pieces once for all, which had already failed fourteen years before at Valmy. This mode of troop-leading could not score any successes, because the foundation therefor, the strategy, had become incompetent. They had given mere *forms* precedence over their true *spirit*, and so no half reforms, no mere patch-work could be of any avail, because the far-seeing glance, the large-minded views of things—as Clausewitz puts it—would have been killed by red-tape and drill-ground wisdom.

There is one other phenomenon of that time, specially characteristic, to which I would like to call attention—I refer to the effect which a fantastic, or, as Clausewitz calls it, a brainsick conception of troop-leading, had in the campaign of 1806 as well as in that of 1805.

I need only mention the names of Mack and Massenbach as the personification of that system of troop-leading. But it must also be remembered that neither of them was simply a theoretical soldier, who had gathered his military experience at the office desk. Mack had served from the ranks up, took part in the campaigns of the Revolution, holding prominent positions, and Massenbach had won in the campaigns on the Rhine the reputation of a useful officer of the General Staff. Indeed, the latter did the army much permanent service—for example, the organization of the great Prussian General Staff, as it stands preserved in great measure to the present day, was due to Massenbach.

The causes of those fantastic mistakes are to be found primarily in the lack of spiritual self-discipline. Mack as well as Massenbach despised the truth, they lacked the desire, the sense of duty I may call it, to see things as they actually are. They despised theory, as well as practice, and each endeavored to set up in their place his own system.

This personal system, which finally reached such a point that it held that all sound principles could be confidently left out of consideration when working with certain small and paltry means, this system was presented and defended by those men with such confidence and regarded as so nearly infallible, that they knew how to meet every objection and how to obtain a considerable influence over the conclusions of military leaders. Both possessed considerable positive scientific knowledge, indeed, Massenbach had been instructed by Frederick the Great in person, and Mack was practically and theoretically in possession of the science of the general staff of that day—and because of this positive knowledge they impressed the great mass of those who had themselves learned very little. Thus, a general intellectual counterpoise, a thing which the stupidity of those men would have rendered impossible, was wanting, as was also that general training which would enable men to recognize from the beginning their inferior understanding and so render them harmless. For this reason did Archduke Charles have to stand out of the way of the influence of Mack, and so the war-tried soldier,

Prince Hohenlohe, lay under the dark power of Massenbach, for there was no sound, generally intelligible strategy which would have at once recognized these sickly excrescences as such. The re-establishment of the Prussian army, of the Prussian state, the renewal of the Prussian spirit, was due to men who before 1806 did not stand particularly high either from a military or political point of view. In that time, however, the traditional glance of the Hohenzollerns which put the right men in the right places, had been proven in a brilliant manner. While, in the political field, the "Jacobin" Freiherr v. Stein began to create a new Prussia, Scharnhorst, regarded slightlying by the practical soldiers as "ideologist" and "learned in books," was the soul of all the endeavors to create a new army.

The *Sciences*, learning and studying in general, which up to that time had been considered necessary only for artillerists and engineers, began now to be honored. The Prussian examinations of officers, which required of the officers theoretical as well as practical knowledge, became the starting-point for a new system, which made knowledge the foundation for understanding. Since that time it has been the pride of the Prussian Corps of officers, regarded at the same time as its duty, to be the best instructed corps of officers in Europe.

This system has also matured principles of strategy which will probably remain authoritative for all time, and in connection therewith an Art of War arose to which are mainly due the successes of 1864, 1866 and 1870.

In the wars of deliverance this new system, if we lay the greatest weight on spiritual and moral factors and not on mechanical and technical things, took a decisive part in the victories obtained, and Field Marshal Blücher more than once said that all his energetic *willing* would never have materialized to *an act*, had not at the same time in the first gleam of light shed on the dark days of 1806, in the expedition against Lübeck, the intelligence of Scharnhorst, and in the years from 1813 to 1815 the active and powerful spirit of Gneisenau given to this willing an aim and purpose.

But the effect of a strategy, which now travelled in the right road, soon made itself felt. The idea that the offensive, *i. e.*, that action is the essential condition of military success had finally effected the downfall of the theory of a learned, weakly, systematic mode of troop-leading. The battle of Aspern had for the first time allowed this theory to pass into a victorious deed of armies other than French.

But that to all bold daring there must be a certain limitation was shown by Napoleon's campaign in Russia, which also taught the fact that in war as well as in other things man's aims must not reach out into the unnatural. Napoleon met with disaster in Russia, not through the skill of his enemies, not alone through adverse circumstances, but because he believed he could force victory by means of an overpowering mass of war material, by means of a gigantic plan of campaign, because in weighing and considering the matter he took as his guiding star only his own vaulting ambition, and overlooked the fact that human strength and human will is limited quite as effectually as human knowledge.

The battles with Napoleon which follow are of worth to strategy because they show, for one thing, what great difficulties the allied leadership brings

with it—again they are of worth because they show that energetic and tenacious holding fast to what is once recognized as correct, even when at first accompanied by defeats, may finally lead to success. Above all they teach and prove that the secret of victory lies principally in being able to lay down the law to the adversary. How this result is to be reached strategy cannot determine—she can only indicate it by pointing to the decided advantages of the offensive. Military history will furnish the material in proof of this view.

The Trachenberg plan of operations, in spite of its theoretical defects, was the foundation of the overthrow of Napoleon in 1813, but it would have remained fruitless had not the re-awakened spirit of the "Forward," in Frederick the Great's sense of the word, looked out for the acts.

After a long period of war now follows a long period of peace. Science, as a matter of course, was now busy drawing the lessons from the events and experiences of a grand and many-sided military activity. First of all they were occupied in the domain of military history. The deeds in this domain were, however, not remarkable. The critical stroke, the rigidly scientific foundation, was wanting. Indeed, military history, from the time of Xenophon's "Cyropedia" (which was looked upon as a romance), up to the beginning of this century, with the exception of a very few writings—among which must be mentioned first and foremost the works of Frederick the Great on military history—had not passed very far beyond romance. Military history was largely one-sided, partisan, praising or blaming according to the stand-point of the historian—it could, therefore, only incompletely perform its proper function of being the best means of military instruction.

Only within the present generation has a change taken place in this matter. Military history has been following more and more in the footsteps of the latest approved method of research in general history, and can claim to-day—and for bringing about this state of affairs the leading place undoubtedly belongs to the Prussian General Staff—to be the best foundation for strategy and the most reliable advisor in military leadership.

But here we find once more in military history, even in official accounts, an attempt to disseminate incorrect views on war under a scientific cloak, in honor of a system of a strategy well known to be false. Field Marshal v. Müffling "inspired" the Prussian General Staff to bring out in the history of the Seven Years' War his personal thoughts on military leadership, thoughts which were weighed down with a geographical and mathematical system both as regards strategy and tactics. This relapse to an antiquated form of strategy the Prussian General Staff redeemed in fine form in its later works.

The most prominent representatives in the domain of true strategy of that time were Jomini, Clausewitz and Willisen. I mention them in chronological order, as determined by the appearance of their most important works, otherwise Clausewitz would have to be mentioned first without any doubt at all. His work, "Vom Kriege," will remain classical so long as there is any strategy. Therein are stated and clearly explained for all time the elements which limit and influence the Art of War.

Clausewitz once for all settled matters with reference to strategy, which at that time was working in complaisant, mechanical fashion with only abstract ideas, which for the most part were not even remotely derived from war. He put in place of these dead conceptions the living, the human. He helped the spiritual and moral factors—intelligence, patriotism, discipline, sense of duty, strength of character—to recover their true place as the pillars, as the “roots of all military deeds.” It is not my purpose to enter more fully into the strategy of Clausewitz—it will remain for all time an intellectual feat of the first quality, and exerted without doubt a decided influence on the spirit in which our last wars have been carried on.

The scientific system of Willisen, whose importance as a theorist is often, but unjustly underrated, is in so far not in accord with the views of Clausewitz that Willisen, led astray by the logical sequence of abstract views and influenced by the love of mere forms, so characteristic of all Germans, allowed himself to be induced to produce a veritable, elaborate *system* of strategy.

The independence of military judgment, the freedom of military action, are thereby too much confined and restricted, and that is opposed to the true nature of war. But men may think of Willisen's performance what they please—what he certainly did do was to point out in a striking manner the connection between military knowledge and military understanding, and most convincing in this connection is the answer which he gave to some one who referred to the difference between knowing and understanding, saying, the difference between knowing and understanding is indeed great, but much greater is that between not knowing and understanding.

Jomini made use in an ingenious way of a considerable practical experience to give an analysis of the Art of War, which shows manifold points of similarity with Clausewitz's teachings of war. This is due to the fact that both, leaving out of consideration Jomini's earliest work, “*Le traité des grandes opérations*,” which takes its starting point in the art of war of Frederick the Great, took the Napoleonic art of war as the principal starting point of their treatises. Still, the German is superior to the Italian (Jomini was an Italian) in depth of reasoning and largeness of views.

Just as it went with the classical writers in German polite literature, who also disseminated feelings and views for which their contemporaries possessed too little comprehension—I need only call attention to the national feeling and patriotism, to which Schiller gave such poetic expression, without finding any practical response in his contemporaries—so also did the classical writers in strategy fare.

Men had soon forgotten again in the long times of peace what decisive power had been inherent to the spiritual and moral factors in great wars—this could not be tested in time of peace, could not be made apparent. In its stead, however, peace furnished good opportunity for perfecting ourselves in the presentation and perfection of mechanical things, especially in the forms of battle tactics. Drill-ground tactics everywhere took precedence again, and just as the Prussian tactics fought with its most brilliant successes when founded on the simple drill exercises of 1726 and 1811 and the battle tactics connected therewith, just so characteristic is it that the decline in

battle tactics is combined with complex drill regulations, overloaded with prescribed forms.

As regards the Art of War between 1815 and 1859, we may remark that it did not in any way—as already indicated—conform to the teachings of a Clausewitz or a Jomini, or the models of the Napoleonic war time. The energy of execution seems to have fallen away. Peace is, in general, not particularly favorable for the development of ethical qualities or for the growth of self-reliant characters—but, aside from all this, the aims of the Art of War were very limited, as, for instance, in the different Russo-Turkish wars, in the wars of 1830-31, in the years of revolution, 1848-49, and even in the Crimean War, which was principally the attack and defense of positions, but in this last the superior intelligence of a Todleben was able to score great successes, and so did the powerful troop-leading of Radetzki in Italy.

The War of 1859 has, in a certain sense, a rather *dilettante* character—on both sides they lived strategically, so to speak from hand to mouth, and no grand thought, directed on a great object received expression. The commanders-in-chief on either side showed no great ability, nevertheless it must not be overlooked that on the French side the greater mental activity prevailed—in the Art of War as well as in the conduct of the battle—while on the Austrian side lack of self-reliance and a tendency to work according to a fixed pattern appear. At all events the campaign of 1859 was not conducted in the spirit nor according to the teachings of Napoleon I. or Archduke Charles.

This weakness of comprehension is most clearly apparent in the review of this campaign of 1859 by the Prussian General Staff. Here can already be felt the paw of the lion, who ejects all paltry strategical and tactical means, which played a great part then—here can already be recognized the acuteness of judgment, the far-seeing eye, which instructed through strategy in Military History, are soon to win unparalleled successes in actual troop-leading.

The campaign of 1854 shows in the plan of operations on which it was based, as well as in the mode of execution, as Prince Frederick Charles strove to conduct it, that even at that time the Prussian art of war was based on large-minded views.

The American Civil War is too widely different in its general relations from the European art of war to be for the latter of important or valuable significance. The lesson, too, which it was thought could be drawn from the attack and defense of fortifications and the so-called "raids," should be carefully considered if we wish to make them of practical use for Europe. But it cannot be denied that the original superiority of the Southern States was above all due to the better scientific instruction of their corps of officers and rested on the great intellectual ability of a Lee, a Beauregard and a Jackson.

As regards the War of 1866, from the standpoint of strategy the criticism may be made—and this has often been done—that on the part of Prussia the "concentration of masses in a Napoleonic sense" was not borne in mind, and the advantage of interior lines was left to the adversaries. In the first

place, this advantage of interior lines could not be disputed with the enemy on account of the geographical position; and, in the second place, it would not have made matters easier for the Prussian leadership to calculate with abstract ideas and theoretical advantages—Prussia accepted the facts as they were, and endeavored to overcome the undoubted difficulties of the situation by energy and mobility. That she was so surprisingly fortunate was due in part, no doubt, to the assistance afforded her by the Austrian plan of operations, which was one based on an incomprehensible theoretical foundation.

This plan of operations sets aside at the very outset the simplest principles of strategy in not bringing to bear the great advantage of interior lines of operation. All the calculations of the Austrian General Staff lie under a fatalistic ban, as it were, inasmuch as it is assumed as a foregone conclusion that the Prussian army will certainly take the offensive, and that therefore the Austrian army must remain in the beginning on the defensive. Moreover, they assumed as certain a Prussian offensive movement against Moravia; much was said in the plan of operations of the fortification Olmutz, of a siege of it, of defensive positions, but very little of actual attack, of any effort to bring about a decisive action. In reading this plan of operations one is carried back to the times of 1794, when the spirit of Mack still ruled. How little the Prussians were prepared to see the Austrian leaders renounce so entirely the modern views on strategy is evident from the fact that, in the work of the Prussian General Staff, on the appearance of which the Austrian plan of operations was not yet known, it was assumed as a matter of course, in the discussion of the Prussian plan of operations, that the Austrian leaders would not give up the evident advantage of interior lines and of a timely offensive movement. But they were completely deceived. And yet there stood at the head of the Austrian Northern Army a general who, as a leader in war, had already won laurels.

I think that it should be stated, in explanation of this surprising fact, that here men sinned against the first principles of modern strategy, that they allowed themselves to be led into false conclusions through the results of the military operations in the year 1859. The Austrians opened that campaign with an offensive movement—and such was held by strategy to be the highest principle of a successful mode of conducting war. This offensive movement failed. It did not fail, however, because it rested on a false theoretical basis, but because it was no true offensive at all. That weakly, slow, dilly-dallying advance in Piedmont has nothing in common with a definite and determined offensive, which goes straight on to the mark regardless of consequences, which does not allow itself to be prevented from attaining its object by any side issues, by any paltry considerations. Had the Austrian offensive borne this character, as is required by the principles of the science, there would probably have been some chance of fighting the enemy in detail, and perhaps making a brilliant campaign.

But while the Austrians allowed themselves, directly on account of the failure of the offensive in 1859—and contrary to the principles of strategy—to be forced into a defensive attitude in the year 1866, they adopted for the battle, in conformity with the military experiences of the year 1859, the shock

tactics in imitation of the French. But in this, in spite of their military experience, they reasoned on false premises. They forgot the needle-gun and, what was of far greater importance, they forgot to take into account the greater tactical mobility of the enemy. Thus they had, in a partial and mechanical estimation of their own military experiences, lost the true measuring rod, as well for the reality of things as for the substantiation of theory.

In pleasant contrast to this stands the method of procedure of Archduke Albert in Italy. Archduke Albert had been known up to this time as a man of reflection, of earnest study, herein following the example of his father, Archduke Charles. Archduke Albert, who was regarded as a learned soldier in comparison with Benedek, made the theory of the advantages of interior lines of operation a reality under the most unfavorable circumstances, the victory of Custoza—he had to take the offensive without hesitation against a far superior enemy; while in Bohemia the theory of interior lines, under the most favorable circumstances imaginable found no realization, the salvation of the Art of War being there believed to lie in the defensive. Archduke Albert proved by actions that strategy is most certainly called upon to constitute the foundation of military leadership, but one must have also the courage, the insight, to apply this principle energetically and judiciously.

The lessons of the War of 1866 were really not drawn outside of Germany until after the Franco-Prussian War, for then it would no longer do to ascribe the overpowering successes of the Prusso-German army to luck, to accident, to extraneous matters, instead of to a thorough and superior generalship. The French entered the war with the strategical assumption that they would probably succeed in breaking through Southern Germany with united masses, according to the pattern of the methods of Napoleon I., and thus make an opening in the German line. They proposed to show the "learned" Prussian General Staff what practical strategy is, the most celebrated representatives of which were the marshals Mac Mahon and Bazaine. Similarly with their views on battle-tactics, the French were convinced that, with the help of their "African experience," their superior military knowledge and their so-called sound common sense in military matters, they could easily get the better of the complicated German tactics.

This sound common sense plays in war as in peace—especially in the latter—so great and easily misunderstood a part so far as the theory of war is concerned, that it may be worth while to consider this matter a little more in detail. It played such a part, for instance, in the Prussian army before 1806, when it was generally acknowledged, particularly by those who were of the opinion that formal drill is more important than the training in battle tactics. In Austria, before 1866, it was regarded as a sign of good common sense when any one regarded skirmish firing as a secondary consideration and the shock of closed masses as the principal thing. Sound common sense is certainly in military as in other things the foundation of all success. But, in the first place, every one will think that he himself possesses it, and hence it would have to be very widely disseminated, and cannot therefore constitute a special endowment; in the second place, from this universality of common sense it follows that it is also disseminated through other armies,

hence it cannot by itself confer superiority. This superiority—and one always desires to be superior to the enemy—can only arise from perfecting sound common sense, subjecting it to a continued course of exercises in theory and practice, filing it down, polishing it; then it will be able to solve problems in war which require intelligence, not simply routine. Now, this routine, which, is so often mistaken for practice, is often also designated a school, and since the last great wars foreigners speak often of a German school of strategy as well as of military leadership. I think this conception is not appropriate. It is intended to convey a compliment, but it is none. From the idea of a school is inseparable that of the orthodox, the mechanically teachable. But such a conception and such treatment strategy will not endure; for, aside from comprising certain fixed principles, it must be alive and active; but much less will it endure such treatment for the reasons which have already been repeatedly touched upon.

In attempting to characterize the Prusso-German military leadership from 1864 to 1871, the comparison with the Prusso-German politics of the last twenty-five years, which is called one of realism, involuntarily obtrudes itself. Just as German politics, free from all doctrinarianism, free from all one-sided special school influences, worked only with the reality of things, so the German military art endeavored to act, free from all pre-conceived ideas and abstract theories, conforming simply to reality, in which it had the indisputable advantage of receiving, on the basis of a classical strategy, an excellent intellectual training.

But, just as the foundations, the moving springs of German politics were always ideal and ethical in character, and still are, even so the Art of War was supported and ruled by spiritual and moral factors, unharmed by the realism of its mode of action. These spiritual factors were the superior intelligence not only of the commander-in-chief but of the entire corps of officers. These moral factors were the same as those which Clausewitz designates as the true pillars of all military success in his teachings on war.

All these factors worked together and gave our military leadership a distinctive character—above all they gave the generalship the stamp of genius, clear and sure in its character.

In connection with a rather mechanical conception of the German mode of conducting war, certain Shibboleths have come into use, which are often given out as the essence of German strategy. Such Shibboleths often do more harm than good. The wise man they make no wiser, the foolish man they only confuse—he will in all probability apply them where they do not belong. The Russians, in the War of 1877, had sad experience at first with their “unrestricted venturing,” with their advance in separate columns—because they proceeded in a purely abstract way, without properly taking into consideration the actual circumstances. The Servians, in 1885, “marched divided” and expected to fight combined—but were in the end defeated while still divided.

Now, with reference to the present state of strategy, there appears to have arrived in this purely intellectual domain, in striking contrast with the restless struggle of all the world in the domain of war material, a period of preparation, of rest. An unprejudiced general view of the situation shows

that in all armies almost the same ideas, the same teachings prevail—as was the case once before, some hundred years ago. A considerable advance beyond other nations in the conception of the nature of war, in strategy, no army can any longer hope to make, hence it follows that in the Art of War too, almost the same principles will be accepted everywhere.

To sum up briefly the generally accepted ideas on the Art of War of to-day, there are three things that must be sought after as the foundation for success. These are: unity of action, simplicity and energy of execution.

Unity of action is essential, because this alone can insure the uniform working in concert of all means and power toward a common end. But, in spite of railroads and telegraphs, in order to preserve unity of action in all the phases of war, there is much greater friction to overcome than formerly in all the spheres of military action, because in consequence of the enormous armies, the difficulties have naturally increased. It is to-day no longer possible to do what Frederick the Great could do at the Battle of Soor, viz.: correct in a quarter of an hour an unfavorable military situation by making a bold tactical decision and following it up at once by its execution. At that time the army was commanded as a division is now. At that time mistakes, even in the strategical concentration of the army, could be corrected in a comparatively short time—as late as the campaign of 1809 Napoleon was able to do this—but in the military leadership of to-day mistakes in the original concentration and advance can hardly be corrected.

The principal means of nevertheless preserving the unity of action consists in bringing about in an army a certain unanimity of opinion on the nature of the Art of War by an appropriate system of general intellectual training. This training must, however, be entirely free from all forms, else the object sought will not be attained, viz.: the promotion of general intelligence in such a way that, in spite of all the independence of the parts, community of purpose will result of itself. It must not be considered an easy task to bring about such a state of affairs, but still the glorious wars of Emperor William show that this is possible, for these very wars are characterized—especially those of 1866 and 1870-71—by unity of command.

The present political situation in Europe has, however, so much enlarged the problems of the Art of War that the unity of action will be still more difficult to preserve than in the last wars. On the other hand, these same political considerations may set tasks for military leadership, than which no grander can be conceived, when we reflect that it is possible to direct armies numbering in the millions towards one fixed object.

The simplicity of action in war is perhaps more difficult to attain than unity—and in this, first and last, the character of the leadership must decide. Does the latter know how to work with great intellectual means—the simplest is always the most difficult—quietly and clearly, its effect will be felt down to the smallest subdivision in quite as uniformly favorable a way, as in the reverse case it will act unfavorably.

Finally, the energy of execution depends externally mainly on its simplicity and unity, internally on ethical and intellectual factors. The energy of execution can only be the result of a harmonious, resolute co-operation of all these factors, based on the greatest possible completeness of war means.

But all these sciences of war here developed are still only built on sand, if in war the spirit of enthusiasm, the *furor teutonicus*, the devotion unto death, the most unselfish sense of duty and all those things which "none can imitate,"—in which is included the strength and superiority of the German spirit,—if these do not furnish the firm foundation pillars for the military leadership!

THE ROLE AND ORGANIZATION OF SEA-COAST BATTERIES.*

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THE great changes undergone by naval material since the appearance of the first ironclads have necessitated a complete overhauling of the system heretofore in vogue in the defense of coasts by artillery.

While the navy has increased by enormous proportions the offensive and defensive powers of its fighting units, at the expense of the number, we have been led, by an analogous progress, to reduce the number of batteries, and to concentrate the defense on a small number of strategical points, the protection of which is of primary importance, such as the entrances to important water ways, military arsenals, and great commercial ports. This action, which was imposed by the increased cost required to construct and arm new batteries, is, in addition, justified by the consideration that portions of the coast of secondary importance do not constitute any longer objectives for hostile forces seeking to attack the coast. The system of continuous occupation and surveillance is from henceforth abandoned, in order that all the resources of the defense may be accumulated around those points, the preservation and protection of which affects in a decided way the commercial prosperity and military power of the country.

But the reduction in the number of batteries, their new uses and the development of their armament are not the only consequences of the new order of things. The progress of artillery has singularly lessened the defensive qualities of earth-works and masonry forts, while, on the other hand, ironclads are much less vulnerable to new projectiles than were their predecessors—the wooden ships—to the projectiles of the old smooth-bore cannon. In an artillery struggle between a low coast battery, firing in barbette from behind an earthen parapet, and an armored ship of recent model, conditions as to field of fire, precision of fire, number and calibre of pieces being the same for each, the advantage ought to be decidedly with the ship, as the armor covering its vital parts yields protection in part at least against the fire of the battery, while the battery, with its pieces and cannoners exposed, can be entirely destroyed by a few well-aimed shells. The old

* From Vol. XXVIII., *Revue d'Artillerie*.

type of low coast battery has been abandoned. The effort has been made in France, and to a greater extent abroad, to increase the defensive strength of coast forts by the use of armor, but this system is too burdensome financially to admit of general use; and it has been necessary to seek, in a complete reorganization, dispositions offering greater latitude in order to neutralize the inferiority of the coast battery, and, if not restoring it to its old position of superiority, at least permitting it to fight its new adversary on equal terms.

To put clearly the principles which ought to govern in establishing, organizing, and arming sea-coast batteries, stating precisely the true conditions of the struggle between batteries and armored ships, is the aim of this study.

CHAPTER I.

ON THE ALTITUDE OF BATTERIES.

1.—Influence of Altitude on Batteries from a Defensive Point of View.

Dead-angles.

There exists around elevated batteries a circular zone, of variable extent, which cannot be reached by the fire of the guns, due to the limitation imposed by the carriage or parapet in using angles of depression. If a piece situated at a given altitude be laid with the maximum angle of depression, the point at which the projectile strikes when the gun is so aimed determines the radius of the zone of the dead-angle for the piece and position.

On the other hand a ship cannot approach a high battery beyond a certain distance, which depends upon the maximum elevation that can be given to the ship's guns. The circle traced around the battery with this radius constitutes, in some degree, a kind of a zone of invulnerability for the battery, and, according as this circle is interior or exterior to the zone of the dead-angle, there will be a resulting advantage to the ship or to the fort. In the first case it will be possible for the ship to fire with effect against the battery and yet be screened from the fire of the battery; in the second case, there will be an annular region in which the ironclad will be forced to receive the fire of the fort without being able to reply to it.

It is important, then, in this connection, to glance at these fundamental conditions of artillery opposed to war-ships.

Attention will be confined to guns protected by armor, which, alone, would be able, in a prolonged struggle, to meet the fire of fort guns. It goes without saying that guns not protected, and especially artillery of small calibre mounted in the open on deck or aloft, will be speedily silenced by the plunging fire of the high battery.

Protected guns of large calibre may be divided into three classes according to the three principal types of armor covering them, the basis of division being the maximum angle of elevation attainable with each:

1st. Pieces firing through embrasures from a redoubt.

Type: ironclads with central fort, *e. g.*, *Hercules*, *Sultan*, *Temeraire*, *Alexandra*, *Superb*, *Belle Isle*, *Orion*, of the English navy.

2d. Pieces mounted in revolving turrets.

Type: movable turret ships, *e.g.*, *Monarch*, *Neptune*, *Devastation*, *Thunderer*, *Dreadnought*, *Inflexible*, *Ajax*, *Agamemnon*, *Colossus*, *Edinburgh*, *Conqueror*.

3d. Guns mounted in fixed turrets in barbette. This is the disposition that has been adopted exclusively in France and abroad in recent years, *e.g.*, *Collingwood*, *Rodney*, *Howe*, *Benbow*, *Anson*, *Camperdown*.

In the first class the maximum angle of elevation does not much exceed 6° or 7° for guns of 24 c.m., and larger.

In the second class, the limit of fire in a vertical direction is generally between 10° and 12° .

In the third class this limit varies according to the calibre of the gun, and does not exceed 10° for the largest pieces.

A broadside ship or a redoubt ship whose pieces have for their maximum angle of elevation 6° would be able to act against a battery having an altitude of 40 to 50 m. from any point along the circle that marks off the dead-angle zone; but, against a battery of greater altitude, the ship will have to stop at a range beyond the dead-angle zone.

With guns which can fire up to 7° elevation the ironclad would have the advantage against all batteries having an altitude less than 90 m., but against batteries more elevated the vicinity of the dead-angle zone would be denied to the ship.

Thus the placing of artillery in broadside or in redoubts on shipboard would seem disadvantageous to the ship when acting against high batteries. But the principal objection to the system from a naval point of view is, that it places altogether beyond the reach of fire all points of the coast above a certain altitude; thus batteries situated more than 105 metres above the water could not be attacked by 24 c.m. guns with a maximum elevation of 6° , because the highest point of the trajectory of this gun under 6° elevation is 105 metres; for an angle of 7° the limit is 139 metres.

For pieces in the second and third category, allowing an angle of elevation of 10° , the conditions are entirely different; as long as the altitude of the batteries is less than 250 metres these pieces can act against the battery from within the dead-angle; it is only above this altitude—which is indeed considerable and rarely exceeded—that batteries have restored to them the advantage over the ironclad.

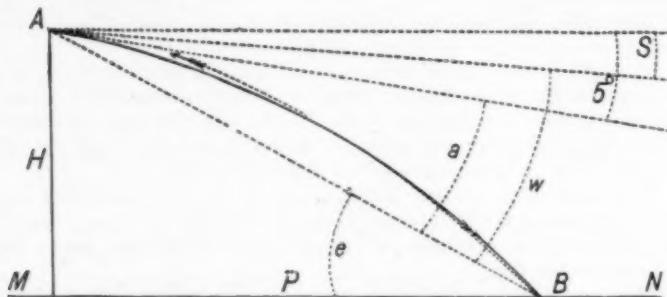
Broadside ironclads and central redoubt-ships are abandoned now in France and abroad; the latest models of war-ships launched or on the stocks are all of the fixed or movable turret type.

It may then be affirmed, in a general way, that in the attack of a high battery, limited in its fire to an angle of depression of 5° , the ironclad will be able to anchor or manœuvre within the limits of the dead-angle zone—that is to say beyond the reach of the battery, and still be able to fire effectively on the battery.

This is one point in which the defense is inferior to the attack, but it is easy to be convinced, by examining further, that the danger is more apparent than real. The region situated within the dead-angle zone of a fort is always under the flanking fire of neighboring forts except in very unusual cases; regarded, therefore, from the point of *general* defense it is a very small

disadvantage. In so far as the defense proper of the battery is concerned it may be said, that an ironclad manœuvring in the dead angle zone is not very dangerous to the battery; under the most favorable conditions, that is when the ship stands just inside the dead-angle zone circle, the projectiles from the ship reach the fort with an angle of fall almost the same as the angle of depression (5°) under which the guns of the fort can fire.

Suppose (in the figure) an ironclad to be situated at B, at the limit of the dead-angle zone from the battery at A, which is at an altitude H above the water level MN.



Let: ϵ be the angle of the altitude H subtended at the position of the ship.

δ the angle under which the projectile from the ship reaches the battery, being regarded positive below the horizontal plane passing through the interior crest of the battery.

α the angle of projection required to give the range P (horizontal distance between A and B).

ω is the angle of fall of the ship-gun's projectile corresponding to the range P.

From these relations we have:

$$\begin{aligned} \delta - \epsilon - \omega \\ \text{but} \quad \epsilon = 5^\circ + \alpha \\ \text{hence} \quad \delta = 5^\circ + \alpha - \omega \end{aligned}$$

But since we are dealing with low velocities ($\alpha - \omega$) is always very small, hence δ is always nearly equal to the angle of depression under which the battery gun can fire, in this case 5° .

In proportion as the ship approaches nearer to the battery δ will grow larger and larger.

Now it is evident that with the exception of the very rare case in which a projectile reaches directly a piece or a carriage, the effects of such fire give little cause for fear, because the high shots will pass over the work and the low shots will bury themselves in the parapet.

Projectiles of the 34 c. m. gun when fired, against batteries at different altitudes, would arrive at the battery in a horizontal direction from the distances given in the second column of the following table, the batteries being

placed at the altitude given the first column, and the dead-angle zone being as given in the third column :

| Altitude of Battery. | Distances for which $\delta = 0$ 34 c. m. gun. | Radius of Dead-angle Zone. |
|----------------------|---|-------------------------------|
| Metres. | Metres. | Metres. |
| 25 | 1030 | 275 |
| 50 | 1420 | 510 |
| 75 | 1690 | 725 |
| 100 | 1925 | 915 |
| 125 | 2125 | 1080 |
| 150 | 2295 | 1250 |
| 175 | 2455 | 1405 |
| 200 | 2600 | 1550 |
| 225 | 2730 | 1685 |
| 250 | 2855 | 1815 |
| 275 | 2975 | 1940 |
| 300 | 3090 | 2060 |
| 325 | 3195 | 2165 |
| 350 | 3295 | 2275 |
| 375 | 3390 | 2375 |
| 400 | 3485 | 2475 |

An examination of this table shows, that, far from being able to profit by the cover offered by the dead-angle, the ironclad attacking a high battery ought to stop at least 1000 metres short of the limit of this zone, under pain of having its fire become almost useless.

The importance of altitude appears then in that it denies to the enemy's ships near approach to the battery.

If we consider the attack of an ironclad standing broadside against a low coast battery, at 1000 metres for example, all the chances are in favor of the ship ; unless a fortunate shot from the battery reaches some vital part of the ship, after having made a breach in its armor, the destruction of the battery will be only a question of a few minutes.

But, in proportion as the range increases, the precision of naval fire diminishes rapidly, while shore fire is much less influenced by distance ; this is evidenced by recent naval operations against coast batteries, it is, then, to the advantage of shore batteries to fight at the longer ranges.

Some additional conclusions may be drawn, viz. : if the scarp wall of the fort be visible from the sea, it will be possible and easy to breach it from the interior of the dead-angle zone, for it is of little importance whether the angle of incidence of the ship's projectile on the scarp be a little above or a little below the normal to the wall, provided it be nearly normal. But this ought never to happen in works constructed with the regular profile ; that is to say, in works with a ditch and with a glacis in prolongation of the superior slope, or even in works whose scarp walls are defiled from sight at a distance. Projectiles will arrive under an angle with the horizontal almost always less than that of the superior slope, and when this is so, breaching fire is not possible, if the scarp is defiled from view from the sea. Shots falling short will bury themselves in the glacis without producing any damage pro-

vided the earth mounds have sufficient thickness; high shots will pass over the battery, and only those shells are to be feared that skim along the slope of the glacis and burst at such a point that the fragments will strike the scarp, and even these will produce a diminished effect because the axis of the cone of dispersion will incline upward.

It may be said, therefore, that the existence of a dead-angle zone around a battery does not present any danger to the battery itself. It is true that certain works have defects, regarded from this point of view; at Toulon, for example, the fort of the Colle-Noire and that of Cape Brun present distinctly visible scarp walls, unprotected by earthworks from the sea side. At Cape Brun the front face of the two-story barracks which occupies a part of the court is visible even from the foot of the escarpment. These are defects of construction which it is important to specify and to correct, but are not cited as arguments in discussing the advantages and disadvantages inherent in high forts.

The considerations which have preceded bring out the enormous advantages resulting to a battery by reason of the altitude of its site above the level of the sea; in a combat with an ironclad, a battery situated between 200 and 300 metres high will be in excellent condition to carry on the struggle, because, at short ranges, the projectiles from the ship will arrive from below upward, and at long ranges naval guns will lose much of their precision.

It thus appears that altitude is the first thing to be sought in a battery of bombardment, that is, a battery whose action extends to a distance and which is not established especially to defend a narrow channel.

In regard to the dead-angle produced by the inability of the guns to fire under an angle below -5° with present carriages, we have seen that this does not merit serious attention; in the first place, because the battery has almost nothing to fear from an ironclad manoeuvring in this zone, and, secondly, because the ironclad will be exposed there to the fire of neighboring batteries. This is not to assert that the angle -5° is one that cannot be exceeded; when our carriages are arranged so as to allow a greater angle of depression than -5° , we shall be able to employ them at certain places where the configuration of the coast does not lend itself to a concentration of fire from neighboring batteries. But it must be kept in mind that the ability to fire from batteries under great negative angles requires a steep superior slope entailing a weakening of the parapet and a diminution of protection for men and materiel.

2.—INFLUENCE OF ALTITUDE ON COAST BATTERIES REGARDED FROM AN OFFENSIVE POINT OF VIEW.

The important effect of altitude regarded offensively is, to increase the efficacy of fire on the decks of ships. It may seem, at first glance, in considering the apparent dimensions of the deck, that the chances of hitting it are very small, and cannot be sensibly increased by any increase of altitude. But the apparent dimensions of the object aimed at has no influence on the efficacy of the fire; it enters into consideration only in pointing; it is conducive to quick and accurate pointing that the object aimed at be easily seen and clear cut, but it is not necessary that its apparent dimen-

sions be considerable, on the contrary, the form most advantageous, regarded solely from the point of facility of aiming, is a simple line.

In considering the efficacy of fire it is necessary to treat first, of the probability of striking the object, and, secondly, the effect of the projectiles on the object.

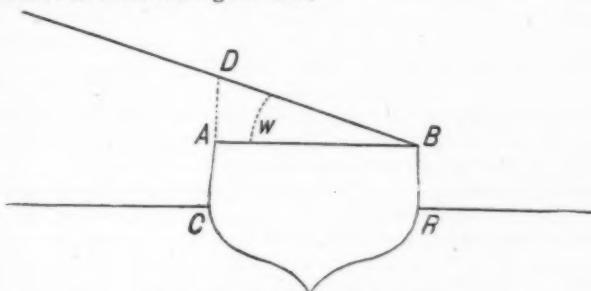
1. Probability of Striking the Object.

Let us take for example the 24-c.m. gun firing with battering shell of 144 kg. weight, and suppose that the vessel stands with broadside to the battery, that is, in the most disadvantageous position in so far as the efficacy of fire with reference to the deck is concerned.

If 15 metres be adopted as the width of the deck, it appears that the probable error in range is less than this width up to 3200 metres; at 6300 metres it is only 20 metres. With the ordinary shell the probable error in range is only two-thirds of the width of the deck at the shorter range, and does not equal it until a range of 6350 metres is reached. It cannot therefore be said that the chances of striking the deck are very small.

If it be desired to compare the chances of hitting the deck with the chances of striking the side of the ship it may be done as follows:

Let DB be the final element of the trajectory. AC is the height of the deck above the water-line. AD is an imaginary position of the side which will receive all shots striking the deck,



$$\text{Now } AD = AB \tan \omega = 15 \tan \omega.$$

If the distance of the deck above the water (AC) be assumed to be 6 metres, the chances of hitting the deck and of hitting the side may be compared for different distances and altitudes. It appears that between 0 and 7000 metres the ratio of chances varies, as 0 to 1 for altitude 0, as 0.25 to 1 for altitude of 100 m., as 0.40 to 1 for 200 m., as .50 to 1 for 300 m., as .60 to 1 for 400 m. At 2500 m. a deck 15 m. wide is equivalent to a vertical wall 1.4 m. high, in so far as the chances of hitting it are considered from an altitude of 0 m., of 2 m. for an altitude of 100 m., of 2.6 m. for 200 m. altitude, of 3.25 for altitude of 300 m., of 3.85 m. for an altitude of 400 m.

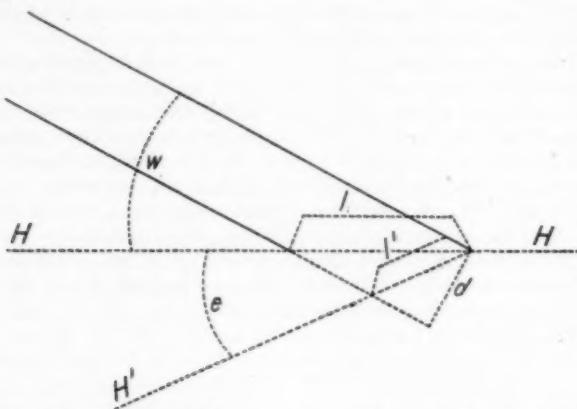
It is thus illustrated very clearly:

1st. That the chances of a high battery striking the deck of a ship are by no means to be neglected; they are, indeed, comparable to the chances of striking the side.

2d. That increase of the altitude of a battery increases markedly for all

fighting ranges, the height AD of the vertical panel which receives all shots that strike the deck.

In order to give an exact idea of the chances of hitting the deck of a ship at different distances it is sufficient to compare the width of the deck with the probable errors of range; but the errors given by the usual tables give only those for batteries situated near the water-line; for elevated batteries it is necessary to correct such errors by quantities which depend on altitude.



Let l represent the probable error in range for α altitude (as given by the tables).

α is the angle of fall given by the tables.

For a high battery the angle of fall will be $(\omega + \delta)$, ϵ being the angle subtended at the ship by the site.

Calling l' the new probable error we have:

$$\delta = l \sin \omega = l' \sin (\omega + \delta).$$

A discussion of these relations leads to the same conclusions as before:

1st. The chances of hitting the deck of a ship are far from being negligible.

2d. An increase of altitude increases decidedly the chances of hitting the deck.

We have just seen that in the most unfavorable case (that is, when the ship presents her broadside to the battery) the chances of hitting the deck are appreciable and comparable to the chances of hitting the side, and that these chances increase with the altitude of the battery. If, on the contrary, the ship stand bow on, then the chances of hitting the side or prow become very small, and almost all the shots will fall on the deck.

In reality the ship will take up a position more or less oblique to the battery, of such a nature that, in a general way, it may be said that the chances of striking the deck are about the same as the chances of striking the side.

2. The effect of the projectiles on decks.

It is generally admitted that protected decks cause all projectiles to ricochet that strike under an angle of less than 10° , and that armor-piercing shells begin to make a breach at about this angle when the thickness of the plate covering the deck is less than the fourth part of the thickness regarded necessary to resist the normal impact of the same projectiles.

In applying this rule to the 24-c.m. gun model of 1876, it is found that the angle of fall of the armor-piercing shell is not 10° until at 4000 m.; at this distance the remaining velocity is 304 m., and this velocity will under normal impact carry the shell through 168 mm. of plate; it appears, then, that 42 mm. of deck covering would keep out this shell at this range.

It is true that for an angle of fall in the vicinity of 10° the normal component of the velocity of the projectile is a little smaller than one-fourth of the total remaining velocity, since the sine of 10° is 0.175, and consequently the thickness of the plate which ought to resist a projectile arriving under the angle of 10° is at the maximum one-fourth thickness of plate necessary to resist normal impact. But, in proportion as the angle of fall increases, the value of the normal component of the remaining velocity increases, and, consequently, the effect of the fire on the deck approaches more and more to that of normal impact. A moment may then arrive at which, although the remaining velocity may go on diminishing, its normal component may be sufficient to perforate deck armor at the maximum of 42 mm.

In general, for a given altitude of battery, and for a given thickness of deck armor, there are two zones of perforations, separated by an intervening zone, in which the deck-armor is not perforated.

The first zone is, ordinarily, almost entirely within the dead-angle zone. The width of the intermediate zone varies in a marked degree with the altitude; with the 24 c.m. gun, and for a deck armor 30 mm. thick, it vanishes at about 325 m.; that is a 24 c.m. gun placed 325 m. high can perforate a 30-mm. deck armor at all ranges. For a thickness of 40 mm. the zone of invulnerability is very wide, its radius varying from 6040 m. to 4530 m. as the altitude of the battery varies from 0 to 400 m.; for a deck-armor 50 mm. thick the radius under the same conditions varies from 6620 m. to 5640 m. It appears, then, that only deck-armor of less than 5 c.m. thickness ought to be considered attackable by the 24 c.m. gun model of 1876.

Now the most recent types of ironclad have their vital parts protected by 30 c.m. of armor and above, and have deck armor of 6, 7 and 8 c.m. In England the thickness of deck armor for several years has been 76 mm. (3 inches); in France it is from 8 c.m. to 9 c.m. It may be considered that the protection thus assured to the deck is almost of the same degree, in relation to direct fire, as that given to the water line and the ship's vital parts by 30, 40 and 50 c.m. of armor. It is not surprising, therefore, that the 24 c.m. gun, which is powerless to perforate the sides of such ironclads, is equally ineffective against armored decks.

But the question of the effect of fire on decks should be examined further. In reality it is not, as a rule, the upper deck which is armored, but that which is just above the water line; the protected deck, when there is an armored belt, is attached to the upper edge of the belt and

joined to it in such a way as to cover entirely all of the ship below the water; above this protected deck is generally found one, two or three wooden decks resting on sheet iron 10 to 15 mm. thick; these decks will always be traversed by 24 c.m. projectiles arriving under an angle of 5° and over. Altitudes greater than 60 m. will always give an angle greater than 5°. Admitting then that 24 c.m. projectiles are without effect on armored decks carrying 5 c.m. or more of armor, they will nevertheless produce great damage in these upper decks; in ships with a central fort they will penetrate within the battery, the ceiling of which is an ordinary unprotected deck; in ships having barbette turrets the large guns are equally exposed to plunging shots and are protected only against horizontal fire. Two or three shots from 24 c.m. guns falling in the battery or the turret will be enough to utterly ruin the guns of the ship, and consequently place it *hors de combat*.

The considerations which have been developed in reference to 24 c.m. guns are equally applicable to all calibres, and it may be stated as a conclusion that altitude increases in a marked degree the effect of projectiles on decks.

Beyond an altitude of 60 m. the angle of fall is always greater than 5°, and ordinary shell with percussion fuse will perforate all decks not covered or protected by armor of 12 to 15 mm.

Beyond an altitude of 220 m. the angle of fall is always greater than 10°, and under these conditions the zone of invulnerability for protected decks is zero for armor-piercing shells when the total remaining velocity is sufficient.

To summarize: it is seen that the chances of hitting the decks of ships by direct fire are substantial and comparable to the chances of hitting the side; with special reference to the 24-c.m. gun model of 1876 a few fortunate hits of ordinary shell with percussion fuse striking the unprotected deck of an ironclad are very effective and would probably place the ship *hors de combat*; in reference to the fire of armor-piercing 24 c.m. shells on protected decks their efficacy will be at least very problematical and of the same nature as that of the same projectiles against the sides of ironclads. In order to act effectively on protected decks it is necessary to resort to the use of rifled mortars of large calibre, such as the 30 c.m. mortar recently adopted by the marine artillery. In all cases altitude increases decidedly the chances of hitting and the efficacy of the fire, and brings, consequently, to sea-coast batteries inestimable advantages.

CHAPTER II.

DISTINCTION BETWEEN BATTERING BATTERIES AND BOMBARDING BATTERIES.

THEIR RESPECTIVE ROLES.

Recently exception has been made to sea-coast batteries on account of their deficiency of power resulting from the small calibres which compose their armament. Guns of 19 c.m. and 24 c.m., the system of which is almost analogous to the model of 1870, correspond to the first phases of the struggle

entered upon between artillery and iron-clads. For a long time the thickness of armor used on ironclads has been greater than that which can be perforated by guns of 19 c. m. and 24 c. m. calibre.

The angle of incidence varies directly with the range, with the altitude of the battery, and with the inclination of the sides of the ironclad at the moment of impact. Taking into consideration all possible inclinations of the ship's side, all possible angles of fall, and all possible altitudes, it may be said that, considering 2000 m. as the extreme limit of battering fire for 19 c.m. and 24 c.m. guns, they can only be effectively employed against forged iron plates of 12 c.m. to 20 c.m. thickness.

It is quite certain, therefore, that batteries armed with 19 c.m. and 24 c.m. guns will not be able, generally, to produce serious damage in the vital parts of ships protected by 30, 40, 50 and 60 c.m. of armor. The conclusion is therefore reached that sea-coast batteries, in their present state, would not be able to render any adequate service against ironclads, and that guns of 19 c.m. and 24 c.m. ought to give place to more powerful calibres.

In order to give a full account of the value of this objection, and in order to acquire a precise conception as to the most suitable armament to give the batteries, it is important to refer to and to brush aside a confusion of ideas often existing in regard to "battering" and "bombarding" batteries, and to establish clearly the respective rôles of these two kinds of works,

1. *Battering Batteries.*

Battering batteries have for their object the defense of channels, entrances to ports and roadsteads; they will have to act against ships which pass before them with greatest possible velocity. The duration of their action will necessarily be very short. They ought not to have a very extended field of fire, because, otherwise, they would be able thus to be attacked from a distance by ironclads, and would find themselves ruined and beyond the power of rendering any service at the moment the attempt is made to force the channel that they are designed to defend. Therefore they ought to adhere closely to the work of defending the pass with the heaviest blows, protecting themselves by the natural relief of the ground, or building, if necessary, artificial traverses. From this will naturally result a diminution of the field of fire in a lateral direction, which will contribute, again, to reduce the duration of their action.

A ship having to pass over a fortified channel will seek to develop its best velocity in such a way as to be the shortest possible time under the fire of the defense; the batteries will have available barely a few minutes during which each piece will be able to fire only one or two shots, and if the passage is attempted by main force by several ships at the same time this small number will have to be distributed among several objects. The question is, however, to stop the progress of the ships, to sink them or at least to cause them such serious damage as to place them *hors de combat*. Such a result can be attained only by giving to the limited number of blows great power and accuracy; that is to say, that the armament of battering batteries ought to be composed of guns with very large calibres, capable of perforating armor of the highest resistance. The range of 2000 m. may be considered as a

maximum beyond which the fire is too uncertain and the projectile energy is too small. Emplacements ought to be chosen, then, at points along the coast as near as possible to the ship channels through which vessels of war will have to pass, narrowing, if need be, the channel by dykes or other artificial obstacles. As a matter of consequence heights are not suited to batteries of this nature, because at short distances even a slight elevation has a material influence on the angle of fall, and an increase in the angle of fall would have the effect of diminishing the extent of the danger zone and consequently the chances of hitting. The following table enables us to appreciate the reduction in the danger zone for the 34 cm. gun (model 1875) between the ranges 1000 and 2000 m. corresponding to changes in altitude from 0 m. to 200 m., taking 6 m. as the height of the object fired at.

| Range in Metres. | Extent of Dangerous Zone in Metres for 34-c.m. gun for Altitudes of | | | | | |
|---------------------|---|--------|-------|--------|--------|--------|
| | 0 m. | 25 m. | 50 m. | 100 m. | 150 m. | 200 m. |
| 1000 m. | 258 m. | 124 m. | 82 m. | 49 m. | 35 m. | 27 m. |
| 1200 " | 206 " | 121 " | 85 " | 53 " | 39 " | 31 " |
| 1400 " | 172 " | 114 " | 85 " | 56 " | 42 " | 34 " |
| 1600 " | 147 " | 107 " | 83 " | 58 " | 45 " | 36 " |
| 1800 " | 129 " | 100 " | 80 " | 59 " | 46 " | 38 " |
| 2000 " | 108 " | 88 " | 75 " | 57 " | 46 " | 39 " |

The effort to obtain high sites for such batteries would, besides, except in very special cases, operate to remove the batteries far from the water's edge and thus to increase ranges, which would be a serious objection.

Battering batteries are, then, primarily, low batteries near to the shore line, and their low site, which exposes them more to the fire of naval guns, is an additional motive urging that they be defiled from distant fire.

To recapitulate: battering batteries have a special and perfectly distinct object, namely, to defend narrow channels, the entrances to harbors and anchorages; they are low batteries defiled from distant view, having a very limited field of fire, firing at short ranges with certainty of hitting, armed with pieces of the largest calibre.

2. Bombarding Batteries.

Bombarding batteries have another rôle to play. They are designed to hold the ships of the enemy at a distance in order to prevent them from bombarding the forts, arsenals and cities, to prevent an attempt to land or any operation whatever against the coast. The radius of action of these batteries ought then to be as extended as possible; in return, they can be attacked from a distance and from several points at the same time, and, in a fight which may last several hours, open batteries could not resist the fire of ironclads, if their inferiority from a defensive point of view be not compensated by special advantages, and if they be not able to support each other; both of these conditions are met in elevated sites.

It has been shown above what immense advantages altitude gives to batteries. The ranges in this case being without limit, the reduction of the

dangerous zone is altogether of secondary importance, and this disadvantage is largely made up for by a greater efficacy of fire on the decks of ships. But while the battery fires on the ship with a plunging fire, the latter fires on the battery from a lower plane, and, if the battery has a regular profile, or even if the scarp wall is defiled from distant view, and if the parapets have sufficient thickness, the fort will suffer very little from such fire. The fire from an armored ship against a high battery will be really effective only from a distance, in which case the angle of fall is so great as to reach the terreplein and carriages behind the parapet. This distance is considerable for altitudes of 100 m. and above. The first effect of altitude will be then to oblige armored ships to stand off at long distances from the batteries being attacked, and it is well known how much naval fire loses its precision when the range exceeds 1500 or 2000 m. Experience shows that accuracy of fire decreases much more rapidly for guns afloat than for shore guns, even supposing the ship to be in motion. Increase of fighting range is, therefore, a condition favorable to coast batteries.

It has been shown, likewise, that increase of altitude augments considerably the efficacy of fire on decks, protected and unprotected, which are the most vulnerable parts of armored ships. Projectiles are moreover more dangerous in proportion, as they strike the deck under a high angle, for then there is a greater chance that they will penetrate through to the machinery and the vital parts of the ship.

Finally, altitude contributes still further to increase the safety of sea-coast batteries by rendering them more mutually supporting. Several ironclads can open their broadsides at short range on a low battery in such a way as to concentrate their fire while escaping partially the fire of neighboring batteries, which can only act when the enemy's ships are at some distance out from shore. If, on the contrary, the battery is elevated, the ships cannot run in near to shore, and their ranges are about the same with respect to the battery they may be attacking as the ranges of adjacent supporting batteries are with respect to the ships, and these neighboring batteries can therefore act on almost as favorable conditions as the battery being attacked.

Practice firing out at sea shows that the splash of the shot can be more readily observed, and thus the fire better adjusted, when the battery is elevated above the level of the water; this is an additional advantage resulting from altitude.

Thus altitude increases the offensive power and the defensive strength of coast batteries to the point of assuring to them a material superiority over armored ships in a combat with them, while low batteries would be certainly destroyed. In cases where the natural relief of ground is not sufficient, the employment of armor-protection is the only way in which the inferiority of the shore battery to ironclads can be prevented.

As to the dead-angle zones resulting from the fact that the present 19 c.m. and 24 c.m. gun-carriages will not allow a greater depression from the horizontal than 5° we have shown that no serious disadvantage can result therefrom. They do not constitute a danger for the battery, and, in any case, the existence of the dead-angles will not warrant us in hesitating

to reap the advantages coming from an increase in the altitude of a battery. In certain particular cases, for example in fighting at points along the coast where a dead-angle cannot be avoided and where this zone is screened by natural features from the fire of neighboring batteries, it will be useful to have carriages permitting a larger angle of depression. But, in general, this is not the solution to be sought, for it requires so great an inclination of the superior slope that the covering mass would be dangerously weakened. The only way to fight directly within the dead-angle zone at ranges beyond 1000 m. to 2000 m., preserving the offensive and defensive advantages of altitude, is to be found in the employment of rifled mortars of large calibres, the adoption of is also further imposed by other considerations to be unfolded herein later on.

Bombarding batteries are, then, elevated batteries (if the topography permits), designed to fight at long ranges in order to protect the coast against the enterprises of the enemy. For them the duration of the combat will not be limited to a fleeting moment, as is the case with battering batteries; the struggle will sometimes last several hours. It will be carried on generally at such distances as will render it impossible to perforate the armor of the ships whatever be the calibres employed by the batteries, because, in the first place, the plates now carried on ships cannot be pierced, even by the most powerful pieces, except at short range, and, secondly, because the surface covered by the armor is very limited, and at long ranges the chances of hitting it are very small. The mean height of armor belt above the water is, indeed, only from 1.5 m. to 1.8 m.; it is true that the redoubt causes it to run up to 4 m. or 5 m. above the water line, but elsewhere its width is very limited, and, besides, the most recent armored ships have not the redoubt. On account of all these considerations it is admitted that battering fire will be employed but little beyond 2000 m. Thus for batteries of bombardment battering fire can be only the exception. The chance of hitting being much less than for battering fire, and the time at disposal not being so limited, the number of shots ought to be a much more important factor than the energy of impact. It is conceived, then, in a general way, that the armament of bombarding batteries ought to be composed, not like battering batteries of few pieces of large calibre, which by construction are not suited to a long-continued fire, but of a large number of pieces of smaller calibre susceptible of use in rapid and prolonged fire.

In order to arrive at precise conclusions as to the composition of the armament, it is necessary to study the structure of the armor-clad ships with which the batteries may have to engage in combat. We shall be assured thus of the possibility of hitting them, if not in their vital parts, at least where their guns are, (which are their *raison d'être*), in the unprotected parts of their hulls, or in their rigging, on which their manœuvring powers and their steadiness depend; in a word, to put them *hors de combat*. This study will furnish us at the same time certain facts by means of which we shall be able to fix approximately the nature and calibre of the pieces to be employed in bombarding batteries, as well as the manner of utilizing them in relation to the type of armor-clad.

LETTERS ON INFANTRY.

By PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by Lieut. ODON GUROVITS, 11th U. S. Infantry.

X.

FLANKING MANOEUVRES AND FORMS OF ATTACK.

I NOW desire to discuss more fully some of the matters I referred to in my previous letter. In that letter I mentioned "the natural strong desire to lay particular stress on the results of attacks on the flanks." It is quite unnecessary to dwell upon the importance of pressure on the hostile flank, since every one knows that, owing to the effectiveness of modern fire-arms, the defensive, attacked only in front, will hold out as long as their ammunition lasts or until they are forced, owing to losses, to retire. Should one, however, succeed in gaining the enemy's flank, then the victory is assured.

The question, therefore, is, how to reach the flank?

But two means are available, viz.: surprise or superiority in numbers.

We can make use of the former when we have roads leading both towards the flank and also towards the front of the defender (and I am inclined to call this the strategical mode of operating upon a flank), also by a skilful use of such cover as is offered by the accidents of ground or houses, woods, etc., which permit part of the available forces to throw themselves unobserved upon the flank of the enemy. *These two methods, however, cannot be practised on the drill ground.*

There is rarely a drill ground which would permit a practical trial of "the use of different roads," or "the use of cover"; moreover, the battalion is too small a unit to divide it according to strategical ideas. Therefore, the only illustration of flanking which can be practised on the drill ground is that arising from superiority of numbers. Here one must suppose the imaginary enemy to be inferior in numbers to our own battalion, and then extend our front until it overlaps that of the enemy. In such a case, when advancing to attack, that part which first comes upon the enemy is necessarily delayed on account of the skirmish; while the overlapping part of the forces will continue to advance by a wheeling movement, and, if the touch with the firing line remains unbroken, will naturally assume the offensive upon the hostile flank. But, owing to the limited space on the drill ground such an illustration will always appear unnatural because the force designated to attack the flank is, throughout the entire manoeuvre, within the effective range of the supposed enemy.

Hence, I am of the opinion that every attempt to form an offensive flank, save that of overlapping the front of the enemy by change of front, should be banished from the drill ground. The strategical considerations,

such as the judicious employment of ground to effect surprise, etc., must necessarily be postponed for the field exercises and field manœuvres.

How can any one conceive a surprise on a drill ground? When such a supposition is made, its absurdity is at once apparent to the men.

The only opportunity to illustrate such a surprise is afforded at the time of the manœuvres where an enemy exists against whom to operate and who is actually surprised; then the effect of an operation upon the flank can be observed.

It is true, however, that our regulations direct that every possible form of attack be practised on the drill ground without regard to terrain.

Therefore, the only possible way to comply with these regulations is for the battalion commander to explain to his battalion what he intends the ground to represent, should he desire to send a company to execute an attack upon the flank of an indicated or fictitious enemy—but it will always appear unnatural.

I also referred to the manner and form of attack upon a position (such as a village, wood, intrenchment, etc.) without cover and exposed to the fire of improved arms.

Furthermore, I stated that this question was a prominent one after the last war, and has since been discussed in essays and experimented in on the drill ground. All the propositions made, however, have met with more opposition than support, and no definite conclusions have been arrived at. Still it is a question that all of us should interest ourselves in because of the enormous losses that the Corps of the Guard sustained while advancing to the attack over open ground at St. Privat. The regulations do not give positive directions about it, but simply say in a general way (par. 127, page 190) to endeavor to lessen the effect of the hostile fire at a halt and also when moving; and recommend when exposed to the fire of shell or case shot, to adopt formations of least depth and, when exposed to shrapnel fire and especially to rifle fire, to lie down and to adopt formations in smaller columns with least possible front. Thus, ample latitude is allowed us by the regulations for experimenting upon the methods already made use of in war and also upon the various propositions since suggested by individuals.

There is good reason to observe that a position such as a village, wood, etc., is not to be attacked at all in front when the ground leading to it is level or such as to offer no cover of any kind. In such a case the attacks must hold the attention of the enemy by artillery fire while the infantry operates on the flanks or attacks where the ground is such as to permit an approach or by outflanking.

This is very well, provided there is a choice. Such, however, is not always the case. There are cases where infantry, its right and left resting on other bodies that have favorable ground, must advance to the attack over level ground. Should then such infantry say, when the order is received to advance, "*I cannot, therefore, I will not obey!*"

For it, then, the question at once arises, how to advance and at the same time decrease the effect of the hostile fire? The regulations do not prescribe how, especially, should the plain in question be exposed to shell, case, shrapnel and infantry fire all at the same time.

We must then fall back upon our war experience, should we desire to form a definite idea of how to proceed in such cases.

In the battle of St. Privat the Infantry of the Guard left its cover, the fold running from north to south, situated west of Ste. Marie, in order to attack the position.

Before it succeeded in forming battalion columns it experienced an intense infantry fire at a distance from the enemy which, up to then, was considered as secure from infantry.

The infantry continued to advance, but the enormous losses, constantly increasing, loosened the columns and units of command. After the intensity of the hostile fire brought the advance movement to a halt, the most advanced troops of the attack becoming swarms, at about 500 to 600 paces from the long inclosing walls, lay down and returned the fire. The most advanced infantry lines of the 12th Corps, prolonged on the left the firing line of the Infantry of the Guard. Part of the infantry of the defenders had been in advance of the main position on the bare slope which, as soon as attacked, retired to a position farther up, and was finally driven from the highest brow between St. Privat and Amanvilliers. While part of the attacking artillery established itself there, the remaining batteries closed in on the fighting infantry and supported it with a fire *en masse*, not one of the shells missing its mark owing to the short range. As soon as the left wing of the 12th Corps advanced upon St. Privat from the direction of Roncourt, the attack formed almost in half a circle about the village. One of our infantry generals who directed the fire of the first skirmish line (upon noticing that the fire of the defenders ceased entirely from the crenellated walls which surrounded the gardens around the village) turning to his adjutants, said: "Now at it, otherwise we never shall get the village." He wheeled about to transmit the necessary orders, when the entire first skirmish line, inspired by the same thought, jumped up and with a great hurrah ran into the village, as if obeying an order transmitted by electricity.

This last run brought but few losses, as it appeared that the defenders had retired into the village. A long hand-to-hand combat took place as soon as the houses were reached, and it was probably with the reserve forces of the village who advanced to replace the line which had fled from the walls. As far as I could observe from my position with the artillery line to the right of St. Privat, this is a correct statement of the case.

Moreover, on the morning after the fight, which lasted until night, I found many of our infantry which came from Ste. Marie, towards St. Privat, dead and wounded, scattered over the entire field. These traces became denser and denser until they almost made a continuous line in the form of a halfcircle around St. Privat, some 500 or 600 paces from it.

In the near vicinity of the village but few had fallen. Some of our comrades drew the conclusion that the French rifle carried too high and that our men also, when near the enemy, fired high. However, we must seek another cause. Our infantry simply had the greatest losses at the distance from the village where it remained fixed the longest time, returning the enemy's fire. Then it took advantage of the right moment, that pause

where the hostile fire was almost entirely interrupted, to make the final rush.

I have previously called attention to a case at the battle of Sedan which tended to prove how invincible infantry is when attacked in front, provided it has ammunition and remains calm and unbroken. Therefore one must endeavor to shake it, no matter how, by a pressure upon its flank or by fire before entering its effective range of fire. We acted according to these principles when attacking in the battle of Sedan.

The very same Infantry of the Guard (although different battalions from those that began the attack on St. Privat) took the Bois de la Garrenne fourteen days later at Sedan. I stood east of Givonne with the ninety pieces of artillery of the guard which extended from the edge of the valley towards Daigny. The hostile artillery fire had been silenced entirely and General von Pape intended to take the Bois de la Garrenne. He spoke to me of it and directed me to shell the wood with my artillery for a certain period, and remarked that he would, at a specified hour (we compared our time for the purpose), advance from Givonne to attack, at which moment I should cease fire because of the position of his infantry.

Everything was executed as directed. After my ninety pieces had poured a deadly fire into the woods at short range (the distances varied between 1200 and 1600 paces) the Infantry of the Guard (rifles of Guard and fusiliers) climbed the heights and gained the *lisiere* of the wood.

Over 10,000 prisoners (not wounded) were brought in by these troops. On this occasion the Infantry and Rifles of the Guard lost but 12 officers and 286 men during the entire battle of Sedan; only a small fraction of this loss, however, occurred when attacking the wood, because the same troops had previously taken Givonne and also had some casualties while fighting in the interior of the wood.

In the battle of St. Privat the Infantry of the Guard lost 8000 men. But the fight for the Bois de la Garrenne cannot justly be compared with the attack upon St. Privat, because the former could be approached unobserved by following the deep valley of Givonne up to a few hundred paces, while the only approach to St. Privat was a bare *glacis* almost one-quarter mile* distance.

The storming of Le Bourget, August 30, 1870, which I witnessed, might more properly be compared with the attack on St. Privat. The left wing column, the Alexander Regiment and Rifles of the Guard, with two batteries, advanced from Le Blanc Mesnil against the village. The artillery prepared the attack, finally taking position close to the village. The artillery and infantry fire drove the defenders from the outskirts of the village, which was reached by the skirmish swarms with very small loss, especially from the south. Losses began to occur, however, as soon as street fighting started. Specially instructive (with regard to attack formation) was the attack that was executed by the right wing from Dugny towards Le Blanc Mesnil, because infantry attacked without having the support of artillery. There was a fire upon the flank delivered by the horse artillery stationed north of Pont Thlon, upon the west brow, but on account of too great a range, it could not have had much effect.

* German mile.

There were two battalions of the Franz Regiment that had to advance almost 2000 paces over an open field. The leader, however, had previously practised the form of attack adopted on this occasion. In accordance with his drills the entire first line, consisting of two companies, was divided into two wings. The wings then advanced alternately across the plain in runs of 300 paces each, at the same time separating themselves into dense swarms. After each run the wing flapped down on the ground and caught its breath, finding cover in the potato vines, the other wing meanwhile running. As soon as the range of the needle-gun permitted, the wing on the ground poured a heavy fire on the outskirts of the village. Even now while I note this episode I hear the echo of the cheers of us critics from our position upon observing this well-considered and well-executed attack. The best part of it, however, was that the troops had scarcely any casualties until the village had been entered; so I have been assured by their leader. Still there were many losses during the hand-to-hand combat in the houses.

I can readily imagine the embarrassment that such an unusual mode of attack would produce along the French skirmish line. As soon as you observe the first advancing swarms, you naturally fire at them. But suddenly they disappear from view in the potato vines. The smoke of the defenders' fire, delivered from behind walls and fences naturally obscures the view, and it is a question whether they observe another line running or not. The line of defense is not straight but follows the outlines of the village, therefore, it is impracticable to cause all skirmishers to change sights and their aim at the new enemy. Should one, however, succeed in this attempt, it is quite probable that the required distance would have been run by the second wing, and it in its turn out of view in the potato field, while the first wing again rises and runs unobserved on account of the smoke and so, finally, both wings have gained a point within the effective range of the needle-gun. At this stage the resting wing showers the defenders' position with a storm of projectiles while the remaining one can complete its run with but trifling loss, the defenders' fire being directed upon the resting wing to silence their fire.

It is but human to believe that the defenders, surprised and suddenly overrun by the enemy in their immediate vicinity, yielded their position as a consequence and retired. One might claim that the troops of the defenders on that day may have been very inferior, being made up of marine infantry, old infantry, garde mobile, and Franc-tireurs de la presse. But these very troops fought extremely well in the combat in and around the houses of the village; still I never learned what troops defended the outskirts of the village. As to the formation of the attacking body I must add that the skirmish line was followed by two other lines (the second again subdivided into two lines) which marched in a quiet, steady gait behind the centre of the first line of skirmishers, but with intervals between files so as not to offer a too compact target for stray bullets.

Although the attack upon Le Bourget on this side succeeded without any apparent assistance from the artillery, yet you will agree with me that an attack upon a similar position has but little hope of success when approached from its front only, the ground at the same time affording no cover.

In connection with this I now recall an attack upon a village which was conducted according to the ideal manner. We find it briefly mentioned in the efficient work of the General Staff, part II., p. 668. The annual books for Army and Navy give a detailed account of the particulars of that attack in the March number, 1872. According to that account, in the battle of Beaugency, December 10, 1870, General von Treskow, not desiring the enemy to continue the occupation of Villejouan, which threatened his right flank, directed an intense artillery fire upon it. Two batteries were specially directed against the village and they shelled it for two hours. It was observed that the enemy retired into the interior of the village to avoid the effect of this fire. Our infantry (76th fusiliers) had instructions to approach the village without masking our artillery. They gained a position within 200 paces from the village before being fired upon. They then rushed with a hurrah into the village.

Those of the defenders that remained at their posts in the outskirts were easily overpowered, but the greatest part must have fled, because the entire battalion lost but four officers and eighty-eight men, although fighting in the village proper lasted from noon till evening. The surprise of the enemy rendered comparatively easy the victory that followed. The battalion was formed in two lines. In the first line were the 10th and 11th companies, each throwing two platoons to the front as skirmishers; the 9th and 12th were in the second line. The latter followed as half battalion in the centre behind the first line; as soon as the first line pushed into the village on the east side the second line was directed to the north side whence it entered. We shall always have to proceed similarly in the future, notwithstanding our present weapon has a much greater range.

In the future we shall also be able to unite our fire with that of the artillery should the defenders not be sufficiently shaken by the latter fire alone; therefore we shall reach our objective with much greater security. If the enemy is once driven from his position on the outskirts of the village then any formation can be adopted by the infantry in approaching. But if the artillery fire is not sufficient to destroy or drive the enemy from his positions in the outskirts then the success of the Franz Regiment teaches us in what formation infantry has to advance to the point where it commences to return fire, viz.: in dense skirmish swarms.

The support will do best to adopt a line formation, and there is nothing in the regulations prohibiting them from leaving an interval of the width of a man between files to lessen the effect of stray bullets. The second line can follow in line or close column until necessarily drawn into the fight—all this I propose for cases where the ground is bare and consequently offers no cover or shelter of any character. When even the least cover presents itself the respective bodies must adopt that formation which would permit of the best use of such cover. * * *

MOUNTAIN ARTILLERY IN EUROPEAN ARMIES.

Translated from the French of CAPTAIN BORDENHORST,

BY LIEUT. C. D. PARKHURST, FOURTH ARTILLERY.

INTRODUCTION.

MOUNTAIN artillery has not a past as ancient as that of field artillery; but it dates back quite far.

Thus already in the 15th century there were cast at Perpignan some pieces of ordnance composed of two parts, and intended to be transported through the narrow defiles of the mountains. These guns were jointed, and carried by pack animals. The small guns and cannon of the 16th century were most often employed in mountain warfare.

Neither mountain nor field artillery possessed at this time a special organization.

It was not until the 18th century, during the War of the Spanish Succession, that the French caused some one pounder guns about 1m. 70 long, and weighing 50 kil. to be constructed. These guns, the carriages and a supply of 12 rounds could be very easily transported by a single mule.

These pieces of ordnance were replaced at first by 4 pdrs., having a length a little more than 1m. and weighing 75 kil.

Later the length was reduced to eight calibres. They were mounted on carriages of forged iron and were intended to be used exclusively as mountain guns.

In 1757, the Marshal of Saxony had made for mountain warfare a piece having a length of 21 calibres and weighing nearly 110 kil. Its projectile weighed a kilogramme. This piece of ordnance, after undergoing some modifications, was advantageously employed by the Portuguese in 1760, during the Spanish War. But yet, at this time, no one thought of giving to mountain artillery a special organization.

Gribeauval himself, the reformer of the French artillery, did not attach any particular importance to it. It was only toward the end of the last century, during the war in Upper Italy that a division of artillery was formed, intended to operate exclusively in mountainous countries. Its material was composed of several 3 pdr. pieces of ordnance, captured from the Piedmontese in 1792. These guns were very light, had a conical chamber to receive the charge, and rested on a flask carriage. These last were replaced later on by a carriage made in one piece, with a trail in the form of a trough. This was intended to receive stones and earth to give a certain preponderance to the rear part of the carriage, and thus to diminish the recoil of the piece.

The charge being quite large, the range of these guns was all sufficient; but the carriage had the inconvenience of upsetting. Later a heavier carriage was adopted which was less durable, and from which it was necessary

to dismount the piece and wheels, and to transport them separately on the mule's back.

The greater part of the guns of which we have just spoken were recast in 1803, and served for the construction of other 3 pdrs., weighing about 80 kil. and mounted on carriages weighing 50 kil. (The weight of the piece and that of the carriages of the Piedmontese being respectively 75 and 80 kil.). In spite of the good results obtained with these guns, considering their solidity, it is certain that their calibre was too small, and that the firing of case-shot was inadequate; these were the considerations which led successively to the construction of guns of 4.8 and 12 pounds. But these latter pieces had to be abandoned because of the great number of pack animals necessary for their transport. It was the same with the 6 inch howitzers and the 8 inch mortars which had been the subject of numerous experiments. They had about the same weight as the 4 pdr. guns and rested upon jointed flask carriages. New efforts were made to overcome the inconvenience of which we have just spoken, and resulted in the introduction of 3 and 6 pdr. guns and of 5½ inch mortars.

The French possessed then a special mountain artillery, but all of its elements could not be utilized everywhere with the same advantage; and the cost of maintenance was far greater in proportion than the useful effect that it could produce.

The employment of an independent mountain artillery appears to have been introduced in Austria a little later. Colonel Wachtendouk, who commanded the Austrian Expedition in Corsica, had made at Genoa some guns of a new class called "falcounets." The guns of the imperial army could not be used in the mountains of that island.

During the Seven Years' War, an Austrian general, who had the campaign in the "Giant Mountains," ordered the frontier regiments of Croatia and Sclavonia to be accompanied thenceforth by the small guns (field pieces) with which he had armed their frontier forts and boats, whereas the ordinary falcounets and the regimental pieces (6 and 3 pdrs.) were often left in rear. It appears, however, that these dispositions were only temporary, and did not end in the formation of a corps of mountain artillery. There was no further question of it in 1753, when Prince Wenzel Liechtenstein, director-general of artillery of that time, caused the rearrangement of that arm with field, siege and fortification artillery.

The regulations of field artillery, published in 1757, make no mention of mountain artillery, and it appears that the events near the end of the last century, that is to say the war against the French Republic, are what contributed the most to give it a separate organization.

At this time light bronze guns—1 and 3 pdrs.—were introduced, which differed only from those used upon the gunboats of the Danube by the knob of the cascable being solid instead of being pierced. These guns were respectively 16 and 11½ calibres in length and rested upon light wooden flask carriages, from which the axles and wheels could be dismounted.

The first precise information concerning mountain artillery of this epoch appears in the instructions upon the transportation of war material for the War of Italy in 1794.

We here find the following table, which gives the supply for the mountain guns :

| Designation of the Ammunition. | 1 pdr. gun. | | | 3 pdr. gun. | | |
|--------------------------------|--------------------|-------------------------|--------|--------------------|-------------------------|--------|
| | Upon pack animals. | Upon reserve carriages. | Total. | Upon pack animals. | Upon reserve carriages. | Total. |
| Solid shot..... | 168 | 72 | 240 | 120 | 80 | 200 |
| Case-shot..... | 24 | 24 | 48 | 24 | 24 | 48 |
| Packages of quick match.. | 23 | 11 | 34 | 18 | 12 | 30 |
| Candles..... | 50 | 25 | 75 | 50 | 25 | 75 |
| Coils of match..... | 1 | 2 | 3 | 1 | 2 | 3 |

We also find further indications in the following orders, given on the occasion of the Tyrolean War in 1798.

Manner of transportation and weight of charge for 1 pdr. gun for the Tyrolean War in 1798.

If two pieces are united :

| | |
|--|----------|
| 1 mule carries 2 guns..... | 175 kil. |
| 1 mule carries 2 carriages..... | 84 kil. |
| 1 mule carries 4 wheels and 2 axles..... | 120 kil. |
| 5 mules carry each 2 cases filled with solid shot..... | 80 kil. |
| 1 mule carries 2 cases containing grape shot..... | 100 kil. |

The service of the piece requires the presence of two cannoneers, and four auxiliaries. One mule carries—in addition—the baggage inclosed in two cord nets. Trenching material is carried in cases formed of lathes. The chests are placed in square clasps, or in stirrups attached to the pack-saddle, the whole covered by a glazed canvas.

The organization of mountain artillery appears to have been abandoned in Austria from the time when the war with France was ended, the material being put away awaiting some future use.

None of the writers upon the artillery of this epoch make mention of the organization of mountain artillery.

A short time after a new war engine was introduced in the artillery—war rockets.

Known for a long time by Oriental people, they were not employed by the English until seen in 1780, in the wars in the Indies.

The Englishman—Congreve—whose name is closely connected with the introduction of the war rocket, sought to solve the question, and made—in 1804—some experiments with such happy results that his countrymen made use of this new engine with a considerable success in 1806 at Boulogne, and in 1808 at the siege of Copenhagen.

The rockets were at first only employed as fire-projectiles, intended to set inflammable objects on fire. But an officer of the Danish artillery (Schuhmacher) conceived the idea of placing a hollow projectile at the front end of the rocket, and to throw them against the enemy. Congreve, in 1814 replaced the hollow projectile by the shrapnel, and the English thus made use of them at the battle of Waterloo.

The use of rockets was not introduced into Austria until 1808, and the first experiments were made close to Vienna on the 24th of March, by the high commission of the Artificers of the Corps of Bombardiers, with incendiary rockets made after Congreve's model. War breaking out, the experiments were abandoned; they were not resumed until 1815, under the direction of Major Augustine, who received the order to establish a rocket factory at Wöllersdorf. Already in August of the same year, Major Augustin reported with two rocket batteries to Huningue, but too late to prove of service.

The favorable results that these experiments had furnished in Austria contributed greatly to throw discredit upon mountain artillery. This new war arm had elsewhere given brilliant results in 1839, in the struggle against the Montenegrins.

In 1829 it was ordered in France that the mountain artillery should only have one calibre of howitzers for the future. This measure was soon imitated by the artillery of nearly all the Powers.

The piece—of bronze—was of 12 pdr. calibre, and had a length of 7 calibres, and an approximate weight of 100 kil. The shell weighed 4 kil. The carriage was of wood and was made in one piece—also the axle. The wheels were made with spokes, and had a diameter of om.95; the track of the wheels was om. 74; the pointing apparatus lighter, and the braking apparatus consisted of a simple cord. Finally a cart or carriage with shafts was attached to the end of the gun carriage.

Seven mules sufficed for the transportation of this gun. One carried the gun, a second the carriage and the five others the ammunition chests.

The French mountain howitzer had met with success in the combats of Algeria, and it can well be said that the complete submission of this country would not have been so easily accomplished had not Marshal Bugeaud had mountain artillery at his disposition.

In 1823 and in 1839, Austria caused modifications to be made in her mountain guns, and in 1844, she adopted the same as France—the 12 pdr. howitzer as the only mountain gun.

The guns were of bronze and weighed 104 kil. It proved to be easily lifted by two men with the aid of short hand-spikes, and could be carried by hand to quite a distance.

The flask carriage weighed 112 kil. and resembled in its construction the carriages of the field artillery. It had a wooden axle, and spoked wheels having a diameter of 95 centine. The track of the wheels was also 95 centine, and the gun carriage had a cart or carriage with shafts and braking cords.

The ammunition was in charges of 12 and 16 half ounces, light or hollow balls, spherical case (?)—(boîter à balles creuses) and hunting case (shrapnel)? (boîtes de chasse). Their range reached 1300 paces.

The transportation of the 12 pdr. howitzer required the service of nine mules—one for the gun, one for the carriage, and five for the ammunition chests, two to each mule, in all 80 rounds. Two mules carried the baggage—one that of the men and the implements, the other that of the two officers.

The English had, from the organization of their mountain artillery up to 1860, 1 and 3 pdr. bronze guns and howitzers of the same metal of 4½ inches, as

mountain guns. The 1 pdr. gun, the 3 pdr. mountain gun, and that of the same calibre, before being made use of in the Colonies, had a length respectively of 30, a little more than 12 and 16 calibres. The diameter of the chamber of the howitzer was the same as that of the 12 pdr. field guns. The length of the howitzer was close on to 4 calibres. The weight respectively of these pieces was about 100, 75, 105 and 160 kil. The carriage was of wood and could be hauled by the assistance of a cart with shafts, or transported in parts, after having been dismounted. The axles were of wood. The mountain batteries and those of the Colonies were composed of three guns and one howitzer. For each 1 pdr. Colonial battery gun there was a caisson. This number was doubled for each 3 pdr. gun of the preceding batteries, and for each howitzer belonging to mountain or Colonial batteries. These carriages were transported (hauled) by the aid of horses.

The Russian mounted artillery was formed up to 1838 of 3 pdr. guns and 6 pdr. mortars. Advantage was taken of the new armament of the field artillery to replace them in the same year by pieces of ordnance of the same kind in bronze.

The 3 pdr. guns rested upon wooden carriages the same as those of the field guns; but with converging flasks. There was no axle body, and the axle was of iron. The wheels were of wood with spokes. Their diameter 87 and their track 79 centine.

At the same time a kind of fire carriage or limber, composed of a cart with shafts and a cushion or bolster intended to receive a chest, and capable of being adapted to the gun carriage by means of a bolt, was introduced.

About the middle of this century there were constructed, for the Caucasian war, some mountain gun carriages of iron, presenting at the same time the characteristics of the flask carriage. They were formed of two parallel flasks bound together by 6 bolts in the form of cross-bars and forged in one piece.

The mortar carriages were flasks also, but without wheels. The two cross-bars that served to bind the flasks together, served also as bolsters, and allowed angles of elevation of 30° and 45° to be given to the mortar.

A mountain battery was composed of 12 3 pdrs. or of 4 mortars.

But soon the introduction of rifled guns, the precision of fire and the great range of the infantry arm, caused the inferiority of the existing mountain artillery to be recognized and caused rifled guns to be adopted.

Austria appears to have taken the first step in this direction. In fact, during the campaign of 1859, she sent as an experiment in the south of Dalmatia, two batteries of 3 pdr. rifled guns, constructed after the system of Lorinz. The 3 pdr. gun-cotton field guns and the mountain guns of the same calibre were introduced in 1862 and 1863 respectively.

At the same time there were adopted in France the 4 pdr. rifled mountain gun; in Italy the $5\frac{1}{2}$ pdr., in Switzerland the 4 pdr., and in Russia the 4 pdr. muzzle loader, and soon after the 3 pdr. breech loader.

The question of rockets was raised anew about 1860 owing to the introduction of the Hall rotating rocket. This inventor was enabled to give them a direct and at the same time a rotary motion by the reaction of the

gas giving to the axis of the rocket the necessary stability and thus allowing the suppression of the stick.

The rotary rockets of Linpöhl were employed in Austria in 1866, but they no longer could contend with the new guns that had been sensibly improved. The use of rockets was then abandoned April 29, 1867, and it was decided that in the future mountain batteries should only be armed with 3 pdr. guns.

There were yet formed, however, in 1869, two rocket batteries to support the operations in the south of Dalmatia. These batteries rendered great service.

But the experience of the Franco-Prussian War, which produced a complete revolution in the armament of the field artillery in the greater part of the European States, also caused a new armament of the mountain artillery.

Spain set the example by introducing into her artillery the mountain gun of 8 cm., m. 1874, Placentian System. Austria, Italy and Switzerland also by adopting respectively the mountain guns of steel bronze of 7 cm., of bronze of 7 cm., m. 1877, and of steel of 7 cm., 5m. 1877. Turkey and Greece gave the preference to mountain guns of forged steel of the Krupp system.

The improvement and extension of the means of communication in the high mountains permitted the use of traction up to the principal high lines and gave to Austria the idea of using—in mountain warfare—the greater calibred field guns with carriages to correspond. After some conclusive experiments this country adopted in 1879 field batteries of 9 cm. with narrow-gauge track.

These batteries possess the same guns and the same ammunition as the heavier field batteries; but the track of the wheels of the gun-carriage and of the fire-carriage, or limber, is narrower. In the first place the axle boxes are suppressed, and secondly the chests have smaller dimensions. For the caissons the wheel track is also narrower, and the chest smaller.

Again, the employment of jointed guns during the Turco-Russian War gave a new impulse to the perfecting of mountain artillery, and we go back to the ideas which prevailed in the fifteenth century. England has first set the example in adopting jointed mountain guns of the Armstrong system, guns which have also been made the subject of experiments in Spain. The two English batteries which were employed in Afghanistan behaved perfectly. The employment of these jointed or dismountable guns, which permits, by the division of the load upon two pack animals, the lengthening of the gun and increase of its calibre, leads naturally to the construction of jointed or dismountable carriages; and advantage can thus be taken of the independence of weight to give them greater stability.

The first practical realization of this idea was had in France by the introduction of new jointed carriages for mountain guns of 80 mm. Experiments with jointed guns and carriages are equally being made in Russia. Here also a mountain mortar is being experimented with, whose plunging fire will have a very great importance in mountain warfare.

In conclusion, we believe that the employment of jointed guns and carriages, the power to use the greater field calibres and plunging fire con-

stitute the greatest progress that can actually be given to mountain artillery.

We give further on the detailed description of the mountain artillery as it now exists in the principal European armies.

1ST. MOUNTAIN ARTILLERY OF AUSTRIA.

At the same time that new field material was introduced in the Austrian artillery, a new mountain gun was also adopted, "the mountain gun of 7 cm., breech-loader, m. 1875," in place of the muzzle-loading gun, m. 1873.

A. The Gun.—The gun of 7cm. is in steel-bronze, and its formature mechanism is a flat quoin. Exteriorily it is composed of the chase, the middle part and the breech.

The chase has a conical form and is terminated by a swell at the muzzle. It is joined to the middle part by a rounded surface. Upon the swell of the muzzle is the mass of the front-sight, which presents a hollowed-out place, tapped to receive the guide for the sight, whose head and extremity are blackened.

The middle part has also a conical form, and carries near its front part the trunnions, relieved from the body of the gun by cylindrical rim bases. Upon the right rim base a hollow place is made with two gaps, to receive a sight, also blackened, which is slipped into the hollow place, and is fixed by two screws.

The breech is joined to the middle piece in a manner sufficiently apparent; it is formed to receive the breech-mechanism, its form is cylindrical, and it is terminated in rear by a plane surface.

The breech mechanism, consisting of a block or quoin, with its loading aperture, and its formature gas-check, etc., etc., slides to and fro in a seat in the breech perpendicular to the axis of the gun. This breech-block has a winch handle, a turn of which unlocks the block, and allows it to be withdrawn to the loading position. Suitable safety screws are provided to hold the block absolutely secure while firing, or to keep everything in place while on the march.

The vent is inserted in the top of the gun in front of the breech-block.

B. The Carriage.—The Austrian mountain carriage is a flask carriage of plate iron, with steel axle. The wheels are of wood, and the hub of bronze.

The carriage has two flasks.

The flasks of plate iron are strengthened by angle plates, knees, the plates forming the trunnion beds and the axle seat.

The wheels have a hub of bronze, ten spokes, and five felloes. The ends of the spokes touch each other and completely fill the space between the two axles. They are bound between them by bolts which traverse the spokes.

This carriage is generally carried on mule-back, but if the roads are good, it is capable of being hauled by the aid of shafts.

These shafts are made with two wooden arms, each terminated at one end by a ring to hook onto the traces and at the other by a clasp to fix the shaft to the carriage.

The weight of the gun-carriage complete, carried by one mule, is 109.39 kil.

C. Ammunition.—The ammunition consists of shell, shrapnel, case shot, heavy and light charges, and friction-primers.

The shell complete weighs 2kg.882. The fragments number 62.

The shrapnel, adjusted, weighs 3.192 kil. The explosive charge is 39 gr. The bullets, are alloy of lead and antimony, one 65 in number. The explosive of the shrapnel furnishes 73 effective fragments and bullets.

The case-shot consists of a cylindrical case of laminated zinc; they are 48 in number, and weigh each 43.64 gr. The interstices are filled with sulphur.

The heavy charges are 35 gr. of ordinary artillery powder. The light charges only 16 gr.

The shell-range extends up to 4000 paces; however, from 2000 the execution is good only against extended objects. If these objects present a certain degree of resistance shell is not fired except at distances under 1000 paces. However, this fire is yet employed against troops under shelter, even at more than 2000 paces.

The plunging shell fire gives execution at distances comprised between 500 and 2000 paces; but it is preferable to make use of it at distances from 1200 to 2000 paces in order to have a sufficient curvature of trajectory.

The efficacy of shrapnel regulated beforehand extends from 450 to 700 paces. These projectiles burst in half at 375 paces in front of the guns. From 600 paces the shrapnel, regulated at the moment of firing, give better results than those regulated in advance. The efficacy of the first extends up to 2500 paces. However, as from 2000 paces the observation and the determination of the position of bursting becomes difficult, it is best not to exceed that limit except occasionally.

If the mark is covered, shrapnel fire is not used except at distances over 1000 paces, in order to obtain satisfactory effects in rear of the cover.

The efficacy of case-shot extends up to 500 paces if the ground is even and hard.

(To be continued.)

MODERN MILITARY RIFLES AND HOW TO USE THEM.

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IN attempting to deal with the subject of this lecture it will be necessary for me to dwell lightly on the various types of modern small arms, the nature of the ammunition, and the changes in tactics and fire tactics which may be expected, consequent on their introduction, and, finally on musketry of the past, present, and future. At the present moment the modern military rifle all over Europe is a magazine arm of small calibre, varying in different countries between 0.298 inch and 0.315 inch.

In these days of gigantic standing armies on the Continent and organized trained reserves, which may be reckoned by millions, any radical change in the infantry arm would be so costly that the present description of rifle will probably remain unchanged for many years to come.

Every nation in Europe has taken advantage of the armed peace which has prevailed since 1877 to re-arm and prepare for the coming struggle, and in this country we have at last obtained an infantry weapon, which, in all the essential qualifications of a military fire-arm, is equal if not superior to any at present in use on the Continent.

The trials which took place in 1888 in India, Egypt, Nova Scotia, and the United Kingdom, were most satisfactory, and more recent experience only tends to confirm the belief that the British Magazine rifle will compare favorably with any other military rifle.

It would take too long to give in full detail all the technical differences which exist in the small arms of different countries, suffice it to say that every European Power is rapidly arming with the same type of rifle, having practically the same range and rapidity of fire, but varying somewhat as regards the calibre, description of rifling, the breech action, and position and shape of the magazine, together with its nature and the number of cartridges contained in it.

The following are the main features in the service rifles of different countries, but the weights are approximate only:

| | Rifle. | Weight. | Calibre. | Magazine. | Rounds. |
|---------|-------------|----------|----------|------------|---------|
| | | lbs. oz. | | | |
| America | Lee | 9 0 | 0.450 | detachable | 5 |
| Austria | Mannlicher | 10 2 | 0.315 | fixed | 5 |
| Belgium | Mauser | 8 2 | 0.310 | " | 5 |
| China | Lee | | 0.433 | detachable | 5 |
| Denmark | Not settled | | | | |
| France | Lebel | 9 4 | 0.315 | tube | 8 |
| Germany | Mauser | 8 9 | 0.310 | " | 5 |
| Italy | Vetterli | 10 10 | 0.409 | " | 5 |

| | Rifle. | Weight. | Calibre. | Magazine. | Rounds. |
|-------------------|-------------|----------|----------|-----------------|---------|
| | | lbs. oz. | | | |
| Japan | Murata | | | | |
| Norway and Sweden | Not settled | 9 2 | 0.315 | tube | 8 |
| Portugal | Kropatchek | | | | |
| Russia | Rearming | | | | |
| Spain | Not settled | | | | |
| Switzerland | Vetterli | 10 10 | 0.409 | tube | 5 |
| Turkey | Mauser | | 0.433 | " | 8 |
| England | Lee-Metford | 9 9 | 0.303 | semi-detachable | 8 |

The infantry fire-arm of 1890 differs from that of 1880 in many respects, the chief points being the reduction of calibre and the introduction of a magazine.

Reduction of calibre allows of the soldier carrying a larger number of rounds on his person without increasing the weight. This alone is a very substantial gain, and it seems probable that the difficult question of how to supply ammunition in the field has been practically solved by the introduction of the small bore rifle.

As regards the magazine, the various types have practically dwindled down to two, viz., a steel box under the action, just in front of the trigger-guard, either fixed or detachable, and a tube under the barrel. The type most in favor, in fact almost universal, is the fixed steel box; America, France, and England are exceptions. The majority of those countries which have the fixed magazine under the action make use of thin steel or tin fillers or clips, to hold together the number of cartridges which the magazine will contain, usually five. This filler, with the cartridges, is either inserted bodily into the magazine, as in the Austrian Mänlicher, and drops out through a slot in the magazine when the last cartridge is fired, or else the filler is used, wherewith to push the cartridges down into the magazine, and is then thrown away or replaced into the pouch. There are many advantages in this latter method of charging the magazine, theoretically it is the perfection of a magazine system, as the magazine can be filled in one motion, the contents expended, if necessary, in rapid fire, and again refilled in one motion, or else one or more cartridges only having been fired, the soldier can fill up his magazine out of his loose rounds, one cartridge at a time. It is worthy of consideration whether this system should not be applied to our own rifle.

The Austrians have boldly faced the introduction of the magazine system, and always load through the magazine, in fact, it is laid down in their regulations "that although the rifle can be used as a single loader, yet it is against the principle of the arm."

The French in their new Lebel rifle have deliberately adhered to the tube form of magazine under the barrel, the same as they had in the Kropatchek rifle. A long spiral spring is compressed at the muzzle end by each cartridge in succession pushing the one in front of it up the tube. There are obvious objections to this form of magazine. It is complicated; would be difficult to repair on service; is by no means easy to fill quickly; and the balance of the arm is altered with every round fired from the magazine.

The magazine on our rifle is a compromise between a fixed and detachable steel box, and it possesses the advantages which are common to all detachable magazines, viz.: that if one gets damaged on service it can easily be replaced, and that troops defending a position can be readily supplied with any number of magazines full of cartridges, to place alongside them, ready for use.

The introduction of the small bore into European armies has necessitated a radical change in the ammunition. To discover the most suitable explosive and bullet has long been a stumbling block, and even at this advanced stage, when the rifle is practically settled, it is by no means certain that such is the case with the ammunition.

Preliminary trials with the new military rifles were carried out in every country with black powder, and the change of weapon was decided upon by the results obtained with it. The principal objections to black powder are dense smoke, fouling, want of uniformity, and the impossibility of obtaining a higher muzzle velocity than 1850 or 1900 f. s. without the pressure on the chamber mounting up to an inconvenient if not dangerous extent.

On the other hand its advantages are dense smoke, stability and fouling. It may seem a paradox to claim for dense smoke and fouling that they are positive advantages, and in the same breath to assert that they are disadvantages. A little reflection will show that under certain circumstances smoke may be very desirable, such for instance, as moving reserves to a flank or pushing up fresh troops under its cover, unobserved by the enemy, whilst to troops defending a position who want a clear front, it would be a positive disadvantage.

The heat generated by the explosion is so great in these small calibre barrels, that some sort of protecting buffer, between the bullet and the bore, to prevent stripping and metallic fouling, is absolutely necessary, and this is supplied by the fouling which black powder leaves behind.

On the other hand, in very hot dry climates the fouling caused by black powder would probably be excessive and a disadvantage.

It is needless further to discuss the merits or demerits of black powder, as it is doomed as an explosive for military rifles; and scientific chemists of every nation have turned their attention to what seems the somewhat difficult task of producing a smokeless explosive, which shall be suitable for the new arm under all circumstances and in every climate.

Every now and again we read a paragraph in the newspaper to the effect that such and such a Power has at last hit upon a smokeless powder for the new rifle, which is perfectly satisfactory. A short time afterwards we read that grave doubts after all are expressed as to the stability of the new powder or its safety, etc. The whole question of the ammunition for the new rifle is a very difficult one, not only as regards the powder but also the bullet.

Several smokeless and semi-smokeless powders, some of home, others of foreign manufacture, have been tried in this country for use in the new rifle with doubtful success.

The Duttenhofer, almost smokeless powder, made at Rothweil, in Ger-

many, gave satisfactory results as regards accuracy, velocity, and pressure on the chamber, but it was thought that it would not be sufficiently stable, and it was given up.

Nobel's smokeless powder, composed of nitro-glycerine, nitro-cotton and camphor, gave even better results than the Duttenhofer powder, but it was feared that the presence of so volatile an ingredient as camphor would assuredly set up some chemical change, and that this powder would not be reliable in all climates. The trials with this compound were not of a sufficiently exhaustive nature to permit of a definite decision being arrived at respecting the effect on the inside of the barrel. Some 300 rounds were fired at Enfield without any sign of metallic fouling. It has been stated that the volatility of camphor, the objectionable ingredient, can be held in suspension without in any way affecting the powder as an explosive. On this point I offer no opinion. It has also been stated that Mr. Nobel has given up camphor altogether.

Sir Frederic Abel's cordite or string powder, if such a term can be used, also gave excellent results as regards pressure and muzzle velocity (2200 f. s.), and the accuracy at 1000 yards, the rifle being fired from the machine rest, was nearly equal to that given by Nobel's powder, the mean deviation being a little more than one foot, but the excessive heat set up in the barrel and the extreme cleanliness of the powder, the barrel being quite bright after each discharge, caused metallic fouling, and occasionally the covering of the bullet was stripped off and remained in the barrel, rendering the rifle unserviceable. There was also erosion.

It was seen that some change was necessary, either in the explosive or the bullet, to overcome these serious defects. Various descriptions of bullets, including one of solid copper, were tried; soft steel and wrought iron were tried as a covering for the bullet instead of nickel, but the result was not wholly satisfactory. Eventually, some substance was introduced into the explosive, and it is believed that the metallic fouling has been got over, but then the accuracy fell off. Granted that black powder is doomed, still it would be rash to predict the exact nature of the ammunition of the future. We, with our army, liable at any moment to a sudden call on service in any quarter of the globe, cannot take powder without careful and exhaustive trials, and we must be perfectly sure that it is perfectly safe and reliable, under all conditions and in any climate, before we commit ourselves to a large order. Failing such an assurance it would be better to put up with smoke and stick to black powder. The French, who have for years been making experiments with smokeless powder, are said to have lately made some change in the composition of their powder, and to be perfectly satisfied with the results obtained. It is also reported that a smokeless powder is now being manufactured in Austria, which is perfectly satisfactory.

An outcry has been made in some quarters as to the delay that has taken place in the issue of the new rifle and smokeless powder, and it has been thrown in the teeth of the Small Arms Committee that they provided a rifle without any ammunition. As regards the delay, such a total change in the arm and its ammunition could not be carried out without very prolonged trials, and the Small Arms Committee submitted the rifle after trials carried out with

Rubin-black powder pellet ammunition made at Thun. Since then the question of the ammunition has been handed over to the Explosive Committee, and the Small Arms Committee are in no way responsible for the performance of the rifle with a novel ammunition over which they have had no control. It is very much to be hoped that all the difficulties connected with the new ammunition have now been got over, and that an issue of smokeless powder will shortly be made.

In addition to the tactical advantages which will be conferred by the absence of smoke, especially to troops acting on the defensive, there are other advantages such as an extended fire or danger zone, and increased penetration, due to the great velocity given by the new powder.

As regards the increased danger zone, in other words the extent of ground within which a man would be struck using the fixed sight (*i. e.*) that for 300 yards. Many people have confused notions on the subject, and talk about the point blank range with the new powder being 500 yards at least. There is no such thing as point blank range in the ordinary sense of the term, and the increase of fire or danger zone which will be gained by the new smokeless powder is very much less than what is generally imagined. All the rifles now issued were sighted with Nobel's smokeless powder, having a muzzle velocity of 2250 f. s., in anticipation of the early issue of our own smokeless powder.

If aim be taken at a man's breast, using the 300 yards sight, he would be struck up to 450 yards with the ammunition now issued, and up to 490 yards with the new smokeless ammunition. It makes no difference whether the firer is standing, kneeling, or lying down.

It is a curious fact that at 300 yards, using the black powder pellet ammunition, the bullet instead of striking below the mark, as might naturally be expected, goes 1 foot high, and at 250 yards $1\frac{1}{4}$ feet high. This is entirely due to the flip or jump of the barrel at the moment the bullet leaves it. When the sword is fixed the sighting is more or less corrected, and the soldier, without having to alter his sight from 300 yards, would strike a man, aiming at his breast, anywhere between 450 and 50 yards. This is with black powder.

It has been urged as an objection to the magazine rifle, that the soldier would expend his ammunition too quickly. When the breech-loader was first introduced the same argument was used. The statistics of the expenditure of ammunition in modern campaigns tend to prove that although in some exceptional cases battalions and companies have fired away a large amount of ammunition, yet on the whole the expenditure has been well within the amount carried by the soldier. At the battle of Königgrätz, in 1866, the 1st Prussian army expended on an average, 12 rounds per man; on the other hand 3 battalions averaged 30 rounds per man, and some few companies as many as 80. At the battle of Rezonville, in August, 1870, the 2d Division of the French Imperial Guard, after a prolonged combat, expended 20 rounds per man. At the battles of Forbach, De Borny, St. Privat, and De Noiserville, the average number of cartridges expended per man in the French army was 30. On the other hand the French troops actually defending St. Privat expended all their ammunition (90 rounds), and the am-

munition carts not coming up, were forced to retire. In the Russo-Turkish War of 1877, the Russians carried from 80 to 100 rounds. General Skobeleff, no mean authority, considered that 130 rounds were necessary to keep up a fight, once that troops were fully committed to it. Expenditure of ammunition is to a great extent a question of training and fire discipline; and as the soldier will be able with the new rifle to carry 98 rounds in his pouches, without counting the two extra packets which would be issued from the ammunition cart for his pockets, we may fairly conclude that the introduction of the magazine rifle should not be dreaded, on the grounds that there will be an undue expenditure of ammunition. One of Suvaroff's maxims was "Fire little but straight"; and Marshal Bugeaud used to say "A good infantry husband their ammunition."

As the new rifle is sighted up to 3500 yards with smokeless powder, it may be assumed that in the future, fire, under certain circumstances, will be opened at much greater ranges than has hitherto been customary. In "Infantry Drill, 1889," rifle fire from 1700 to 800 yards is classed as unaimed, and useful field artillery fire is limited to 3000 yards. Recent experiments with the new field gun and new rifle foreshadow aimed and effective fire at distances very much in excess of these. As far back as September, 1888, detachments of nine men from the 1st Devon, 1st Suffolk, 1st Sussex and 1st Battalion King's Royal Rifle Corps, made excellent practice at 2400 yards, and fair at 2800 yards, although the rifle was strange to the men, and they had no previous experience of such long range firing.

The number of hits at the three distances fired at was as follows:

| Distance. | No. of hits. | Percentage of hits to rounds fired. | Object. |
|-----------|--------------|-------------------------------------|---|
| 2000 yds. | 181 | 48 | 4 Companies standing in $\frac{1}{4}$ column. |
| 2400 " | 109 | 29 | |
| 2800 " | 104 | 19 | |

It has been said that extreme range fire is only a waste of ammunition, and has never yet checked the advance of an attacking force; at the same time there are many instances on record in modern campaigns of extreme range infantry fire, even when unaimed, proving very destructive. At Gravelotte and Mars-la-Tour the French inflicted severe losses on the Prussian guard at a very long range. During the Russo-Turkish campaign, in 1877, the Russian reserves suffered heavily from the extreme range fire of the Turks, although it was in every sense of the word unaimed. As regards the fire of modern field artillery, good practice is now made up to 5000 yards, and even beyond. At Okehampton last summer 146 hits were made at 5000 yards, on 90 dummy figures, representing a company in column of fours coming over a hill, the head of the column only being visible; time occupied in firing, 10 minutes. At 2500 yards, 5 shell fired at 70 dummies in a shelter trench struck 11 of the figures. At 4800 yards, a target 6 ft. by 6 ft., was struck once out of 10 rounds; and at 4900 yards the hits on a space of ground, 100 yards in depth and frontage, were 50 per cent. In all these cases the range was found as on service.

May we not conclude, that in future troops will have to deploy from

columns of route at a greater distance than is laid down in our regulations; also, that infantry fire, especially if picked men are employed, will be effective, and cause losses at distances hitherto undreamt of?

In order that full value may be got out of the new arm, great care will have to be taken in training officers, non-commissioned officers, and men to the intelligent use of the rifle under all the possible conditions of modern warfare.

We have no experience to guide us as to the effects of small bore magazine rifles and smokeless powder in war; but as every change in the infantry arm has hitherto brought about a change in tactics and fire tactics, it is only reasonable to conclude that these new steps in advance, made by military science, will necessitate some further changes.

We constantly hear people say: "We have had changes enough, let the army alone for a little while and give us time to recover our breath and look about. We did well enough before, why confuse officers and men by these newfangled ideas and constant changes?" Such sentiments are destructive of all progress and efficiency! An army that stands still in thought or deed is on the downward path, and instead of "Halt," its motto should be ever "Forward!"

Decisive results can only as a rule be obtained by a vigorous offensive, but an attack ill-planned, based on false principles and not carried out in accordance with the tactics required by the power of modern rifles, would nowadays in a European campaign mean total destruction. The attack on St. Privat during the Franco-German War, was a case in point where false tactics caused the Prussian guard in a few minutes to lose 300 officers and approximately 8000 men.

At Maiwand and at Isandlwana, more especially in the latter engagement, the defeat of our brave troops was brought about entirely by false tactics, the same may be said of Majuba Hill and the fight on the Ingogo. On the other hand, the tactics and fire tactics employed at Rorke's Drift and Ulundi, and during the campaigns in the Soudan, generally, were formulated with due regard to the numbers, tactics, discipline and weapons of the enemy, as compared with our own numbers and the powers of our weapon.

In the future, says a modern French military writer, "the troops that attempt to carry a strong position that is well held are marked out for destruction."

It is laid down in the new German Field Exercise "that the only prospect of the success of an attack is to obtain superiority of fire."

During the Russo-Turkish War in 1877, the Russians lost 4000 men in attempting to carry the great redoubt at Plevna, and yet the defenders, although gallant fellows, were ill-instructed in the use of their arms, and fired wildly and at random.

Enough has been said to warrant the assumption that the universal introduction of long range magazine rifles and smokeless powder will confer greater advantages on the defense than to the attack, and that troops of good quality, well posted under suitable cover, and having an unlimited supply of ammunition, will not be turned out of a position by a purely

frontal attack, unless very greatly outnumbered or badly shaken by artillery fire.

No mention is made in *Infantry Drill, 1887*, of magazine rifles or smokeless powder, and consequently no changes in tactics or fire tactics are hinted at. It is for us to consider whether any changes are imperative, in what direction they are likely to be, and if our regulations are sufficiently elastic and comprehensive to meet them. If it be correct that the defense has gained considerably by the introduction of modern rifles and smokeless powder, it may well be asked how then is the attack to be carried out? Simplicity of form of attack, speed, intensity of fire, and well-timed turning movements must be the dominating factors in any changes in the tactics and fire tactics of the attack.

The Germans, who are thoroughly practical soldiers, expressly forbid in their "Field Exercise" any normal order of attack. They say "that in war circumstances always varying play the most important part, and that the letter kills the spirit." This is doubtless based on the experience gained during the Franco-German War. They consider that if the young soldier is thoroughly drilled and disciplined, it is of no use always practising him in one stereotyped form of attack which the varying circumstances of actual combat might not render suitable; but that if practised to act according to circumstances he is less likely to be hurried and confused when called upon suddenly to meet the enemy. The main principles of the attack would appear to be the same in all European armies, but the form differs. It is generally recognized that the force destined to carry out the actual assault must be a distinct body from those who prepare the way. In "The Austria-Hungarian Field Exercise" it is laid down amongst the principles which are to govern the conduct of an engagement with the enemy "that unless the artillery fire is superior to that of the enemy the attack has no chance of success and that the true form of attack is an uninterrupted advance." The Russians say: "It is not the fire of the enemy which destroys the advance so much as the manner in which the advance is conducted; the chief faults generally observed are prolonged halts, wild firing, and an uncertain objective."

The present form of infantry attack as laid down in *Infantry Drill, 1889*, is far more practical than any of the numerous forms of attack which have been practised during the last twenty years; but it is open to doubt whether it would be possible in the face of the fire of modern rifles and machine-guns, with smokeless powder, to advance over ground at all open, in the manner that the attack is practised here at field days, or as field firing is as a rule carried out, without suffering such losses as would inevitably cause the attack to fail. Losses are, of course, inevitable, and no possible form of attack that the ingenuity of man could devise would prevent them, but it may be possible to train our troops to push on more rapidly to the decisive stage than is done at present.

It may seem presumptuous to attempt to forecast in what direction a change in infantry attack tactics is likely to be made, but we may yet resort to a modification of the tactics of former days and again see a cloud of skirmishers advancing in one general line and covering by their fire the

troops destined for the assault who would push on in a loose line. Carefully timed enveloping or turning attacks should be carried out in a like fashion when the nature of the ground permitted. The same careful training which made Craufurd's brigade and the rifle battalions in the Peninsula unsurpassed as bold and active skirmishers, would soon produce battalions in the present day equal to the task of covering an attack, using their own judgment when to fire, and pushing on rapidly over the ground far quicker than the present methods of section volleys, and advances by alternate fractions.

The definite objective points having been determined upon and communicated to all concerned, special troops supplied with an unlimited amount of ammunition would, together with the machine guns, take up favorable positions for assisting and covering the advance by a heavy and sustained converging fire.

In dealing with infantry tactics, the possibility of night marches and night attacks must not be lost sight of.

In order to bring a night attack to a successful issue not only is it absolutely necessary that all the arrangements are thoroughly understood by all concerned, but unless with highly disciplined troops, a night attack would probably fail; and even with the best troops, to insure success it must be in the nature of a surprise. The attack on the lines of Tel-el-Kebir was carefully planned and delivered at the right moment, and its complete success justified its conception and execution. It would be rash to argue from this bright example of the dash of British soldiers that in the future night attacks will be the rule and not the exception.

Great attention has been paid of late in Russia and Germany to the training of troops in night operations, and here, at Aldershot, during the past six months much good work has been done in the same direction.

At Hythe a regular system of night firing, using luminous sights, has been introduced, but it is open to grave doubt whether any firing at all should be permitted in night enterprises; and when firing at very close quarters is unavoidable, sights, whether luminous or not, would be of little or no use.

Night marches are proverbially harassing to troops and they require to be practised, as, unless with careful guides, the direction is very apt to be lost. On the retreat to Corunna one brigade after marching all night found themselves near their old camping ground. Night marches for the purpose of moving troops up to their positions previous to an attack are likely to be made use of to a much greater extent in the future than has hitherto been customary.

As regards cavalry, the possession of a magazine carbine will prove of great advantage, and its introduction may bring about some radical changes in the arm, equipment, and method of fighting of this branch of the service.

Cavalry is essentially an arm of offense, and we may in future see cavalry divided into two distinct categories with different functions. Heavy horsemen armed with lance and pistol, whose rôle would be to charge the enemy's horsemen or infantry when dispersed and shaken, and light horsemen armed with magazine carbine to act as a general rule dismounted. In

other words, there will probably be cavalry pure and simple acting by shock, and mounted riflemen.

We have now to consider the practical training of our soldiers in the use of the new rifles, and if any radical changes are necessary and desirable. When the Council of the Aldershot Military Society did me the honor of asking me to deliver a lecture, I was not aware that H. R. H., the Commander-in-Chief, had done me the honor of selecting me for the appointment of Commandant of the School of Musketry, and as for thirty years I have directed my arrows against the Hythe system, I feel that the appointment has been made on the principle of turning a poacher into a game-keeper, and where I meant to scoff, I now remain to bless. But, gentlemen, do not mistake me; my blows have been directed against the musketry of the past, not of the present, and as for the future, I shall, of course, be the staunch supporter of the Hythe system, whatever it may be. Musketry made a bad start in our service; instead of making it part and parcel of the regimental life and training and mixed up with the daily drill and exercises as it should be, it was carried on as a separate sort of extra training. The result of this was that generals, commanding officers and adjutants, with few exceptions, hated and loathed the very name of musketry.

The chief object aimed at was uniformity, and that perhaps was the sole merit of the old system; every non-commissioned officer and man in the army, almost without exception, had to fire the same number of rounds, and every shot fired was recorded and sent to Hythe.

Field firing was unknown and the ammunition was expended in steady Wimbledon style shooting at fixed targets at known distances under conditions the very opposite to what the young soldier would find on service. If there was more than a gentle breeze blowing practice was often stopped for fear of spoiling the average, and it was of common occurrence to see the musketry instructor on one side bending over the soldier to adjust his sliding bar, whilst the sergeant instructor on the other gently manipulated the paper wind-gauge. What was the practical outcome of all this? Why, that our men became many of them fair, some of them good shots, under certain fixed conditions, but had no practical training whatever in service shooting. We may be thankful that all that is now past and gone never to return.

Some of the old leaven may still linger on, but we are now on the right track.

It is very probable that the introduction of the new rifle will render some changes in the present system of musketry instruction advisable. It would be premature at this early stage of progress with the new arms to say much about future changes, but they will assuredly be based on the opinions of selected officers and non-commissioned officers who have had regimental opportunities of watching the performance of the men with the new weapon.

I have often been asked what is the superiority of the new rifle over the Martini-Henry? I have also lately had letters from India referring me to an account of a shooting match which took place a short time since at Hythe between picked teams with a result that the Martini-Henry more than held its own.

The superiority of the .303 magazine rifle over the .45 Martini-Henry, consists in—(1) the greater extent of ground which the soldier can cover without altering his sight; (2) the greatly diminished recoil; (3) greater accuracy at all ranges, but more especially at the long and extreme ranges; (4) increased penetration; (5) lightness of ammunition allowing of 115 rounds being carried for the same weight as 70; and lastly (6) the power of pouring in nine rapid shots in succession at a critical moment without having to reload from the pouch.

As regards the shooting it is very probable that trained soldiers thoroughly accustomed to the Martini-Henry would not at first make better range practice with the new rifle, especially at short and medium ranges.

Recruits will assuredly make better practice, and for quick snap shooting, the new sights will be found to give better results than the old. I firmly believe the new rifle to be a thoroughly sound and practical soldiers' weapon, and increased familiarity in the use of it will increase its popularity and improve the general shooting of the army. It would be impossible for us to lay too much stress on the necessity and importance of very careful instruction in its use, how to keep it in good working order, and how thorough should be the training of the recruit in these essential points.

It would be an excellent thing if every officer and non-commissioned officer went through a special training under the armorer, and for this purpose one or two rifles in each battalion should be set apart for instructional purposes in the care of arms and all the details of the weapon.

The old relic of imaginary smartness which still lingers in some battalions of making the butts "tell" when coming to the order must certainly be stopped, and 1000 men should come to the order from the slope on flagstones without a sound being heard; this should be a test of good arm drill.

It has frequently been asserted that the shooting of our men on service is indifferent, not to use a stronger term. If this is the case, I submit the question as to whether our training is of a sufficiently practical nature? There can be no valid reason why the British soldier should shoot worse than any other; on the contrary, from his physique, temperament, characteristics, and inherent good eyesight, he possesses all the qualifications necessary to make him a good rifle shot during the turmoil and excitement of an engagement.

For many years there was an outcry that the amount of ammunition allowed was insufficient and a large increase was made in the number of rounds fired by every soldier annually.

Speaking as Colonel Slade, and not as the Commandant of the School of Musketry, I would say that I do not attribute so much importance to this increase in the number of rounds. It is the manner in which the rounds are expended that is the important point. There are three main principles which should govern the instruction of our soldiers in musketry.

First, that too much time and trouble cannot be spent upon the careful and thorough grounding of the recruit in the use and care of his rifle and the use of the sights up to long and even extreme ranges, his future shooting on service depends in a great measure on the instruction he first receives. The

amount of ammunition for teaching a recruit should be practically unlimited. Some men may require 300 or 400 rounds before they are fit to shoot with their company.

Secondly, that when a soldier has once thoroughly learnt the power of his rifle and what can be done with it at a fixed mark, such as a bullseye, at known distances, and what effect different wind forces have on the bullet at various ranges, no other description of shooting is of much or any practical value but field firing, with the exception of skirmishing and rapid magazine volleys at medium and long ranges.

And thirdly, that all field firing and field firing drill should be carried out in service order ; the valise need not necessarily be carried, but the soldier should certainly carry his haversack not rolled up, but with something in it to represent a couple of days rations, his great-coat or blanket, and water-bottle full, and if possible a full supply of ammunition, or equivalent weights. One of the chief causes of wild and indifferent shooting on service is that the young soldier is not accustomed to fire under service conditions. He has hitherto been drilled with a nice flat pouch, and taught to shoot and also practised, in drill order, carrying 10 or 15 rounds, which he frequently does not put in his pouch at all. When he takes the field he is astonished to find instead of his nice flat pouch, two bulky heavy pouches full of ammunition sticking out so that he cannot handle his rifle with ease, and the weight and drag causing him discomfort, he also finds that the braces which support the pouches prevent him from bringing the butt of the rifle into the shoulder with the same freedom as in drill order.

I venture to lay great stress upon the above and consider that all field firing and skirmishing, sectional, company, battalion, and brigade, should be practised and carried out in light service order. It is a great mistake in my opinion to send recruits to musketry too soon, let them be thoroughly drilled and disciplined first, and be perfectly instructed in the care of arms so that they know how to clean and take care of their rifle as well as an old soldier, then let them be taught to shoot, which, by the bye, is by no means an easy matter, and is really quite a special gift.

One of the chief difficulties a commanding officer has to contend with is to find a sufficiency of good instructors, not only for musketry but also for drill. There are many other points connected with musketry which might be touched upon, but enough has probably been said on this and other subjects to pave the way for any remarks from officers who have opinions and views of their own. I only regret that it was not possible for me within the limits of a reasonably brief lecture to go more fully into such important questions.

I feel very much honored by the presence of so many distinguished officers here to-day in whom the army have every confidence, and more especially by that of the Adjutant-General to the Forces, who has so kindly taken the chair. I hope he will permit me to say that all the recent changes in musketry and the present issue of the new rifle are entirely due to his initiative, and I sincerely hope that he will extend to me in my new capacity, as Commandant of the School of Musketry, the same support and encouragement that he has done to my predecessor.

DISCUSSION.

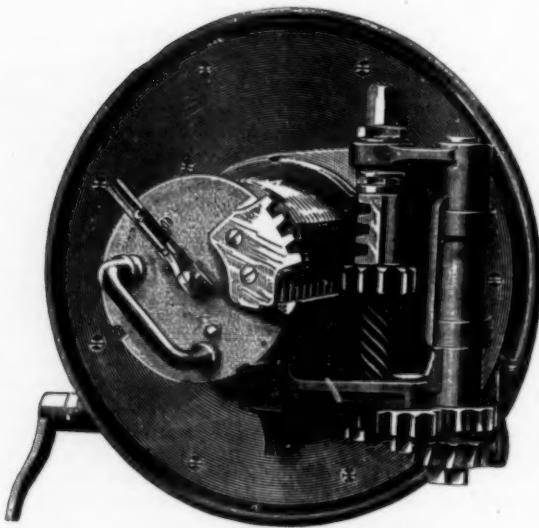
Colonel LONSDALE HALE: Colonel Slade's lecture is full of the most important and interesting questions, but one of them, second in importance to none, has been but slightly touched upon in the lecture, has hardly been referred to in the discussion, and seems to have dropped into the background, viz., the tactics of the battle-field of the future. I could not quite understand what Sir Evelyn Wood meant when he referred to the losses of the future. If the losses are not to be far greater than hitherto, may I ask what is the purpose of the introduction of magazine rifles? What is the use of all the improvements in fire-arms of the present day? Why have a rifle at all? Why not go back to the smooth bore? Why have artillery been spending so much time in the improvement and study of new arms, fuses and projectiles? Listening to some of my friends on this matter I am led to believe that they think the battles of the future will, as regards losses, be like the battles of the past, and that all those modern inventions are to make themselves felt in theory only and not in practice. Gentlemen, we must face the stern fact that the man-killing power of the weapons of to-day of our own and of foreign armies—unpleasant as it may be—is far greater now than it has been in the past; and that the efforts of all nations have been directed towards this one purpose—the making of their weapons more destructive to life. The battle-field of the future will be much greater in depth and width than hitherto, and I fail to see how, knowing this, it can be deemed that the shower of lead which falls at all degrees between the horizontal and the vertical upon this area, and which, owing to the introductions of these quick-firing weapons must be enormously greater than it has been hitherto, will not carry a greater amount of destruction with it. Not only will, as hitherto, every bullet have its billet, but ten times the number of bullets will be seeking their billets. I have been reproached in some quarters for pointing out the increased destructive power of modern weapons. I have been told that doing so may shake the courage of the British soldier. If he is going to have his courage shaken by that, and prove untrue to his traditions, and be more frightened than the Germans, who acknowledge this increased destructive power, and look it in the face, he had better go out of the army, but I don't myself think the knowledge of an increase of danger to his life is likely to make the British soldier show the white feather. The danger is that we won't face the fact, and some of us support the bringing up of our officers and men in a fool's paradise, by telling them that the battle won't be so bad after all or even worse than it has been. But when they get on the battle-field they will assuredly find out they have been living in a fool's paradise, and this revelation coming unexpectedly will be disastrous. I am sometimes reproached for being a "German" in my views. I was able, I think, in a lecture I had the honor of delivering here the other day to show that I am alive to the faults of the Germans as well as to their virtues. But the reason I do look to the Germans for sound instruction is because their military motive power is the instinct of self-preservation. We in England are surrounded by a big ditch and have a sense of security which the Germans have not. They have no such ditch, and they know that unless they have the best army and the very best weapons they are doomed. There is a society at Berlin where military lectures are delivered, and from one delivered in December by a battalion commander there does not seem to be the same sort of antipathy as with us to look hard facts in the face. That officer put forward his views as regards the battle-field of the future, and the difference between its tactics and those of the past. The conclusion at which he arrived is that the losses of the future will be enormous, so much so that the accepted tactics even of the present day, which, you will remember, are very different from those of 1870 and 1871, are no longer applicable to the weapons of the future. Let me remind you that practically the weapons of the future are new, and with "new weapons new tactics." The German lecturer says that what those

tactics must be no one can tell. I hear officers say "I don't like that German drill book, it gives me no distances." The German lecturer tells us that the reason of drawing up the drill book in its present form is because the future is at present impenetrable. Something must be given to go on, but the tactics adopted must be left to the officers who have to carry out the attack. The days of supports in the attack seem absolutely past. They have given it up in the cavalry. The one thing in the future will be the fighting line. There will be no supports, as ordinarily understood, for the simple reason that the supports will never arrive there in any sort of form, owing to the losses they will incur, and the only use the second line will be is to feed the fighting line. The fighting line will have to present a broad front of fire, and the idea of carrying a position by weight of the assault will be out of the question. Those views may be right or wrong ; but at all events I do not believe we should have had those views put forward in Berlin without some sort of sanction from the authorities. Our duty, gentlemen, will be to first induce regimental, and especially company officers, etc., to realize their enormous responsibility in the future. Perhaps they will adopt the advice of the German lecturer, who urges them strongly to go and *see* the fire, artillery as well as infantry, at practice, and to try to realize what the power of the fire is, and then to work out for themselves how they will act on the battle-field. That is the thing—try to realize the enormous change that has taken place of late years and the amount of responsibility that rests upon them. The higher ranks have also to realize their new functions, those of superintendence only, and they must learn to give in peace time to the regimental officers all possible opportunities for exercising themselves in the discharge of the responsibility which has come upon them. In my humble opinion very much of the tactics of 1870 and 1871 are ancient history indeed, and the tactics of the future are yet to be born.

Colonel SCOTT : I am a firm believer in artillery fire, and I heard the remark just now that after two hours bombardment only two shells fell into a rectangle representing a village 90 yards square. I was at Okehampton two years ago and last year, and I noticed three batteries of artillery firing into the same rectangle with the result that over 50 per cent. of shells fell into this village. On one occasion when Sir Evelyn Wood was there I saw a gun fired at an unknown range, afterwards found to be 2900 yards, and at the third shot the whole of the gun detachment was killed and the gun dismounted. I have also seen a black kneeling dummy picked out of a row of white dummies, and two feet square targets constantly struck in three shots, at unknown ranges, varying from 1900 to 2300 yards. I will undertake to affirm that any infantry officer, under proper direction, will be able to do likewise. Such being the case, there must have been something seriously wrong in the conduct of the fire of the battery, which could only plant two shell, out of several fired, in two hours, into a village 4500 yards distant and 90 yards square ! Colonel Slade spoke about the effect of smokeless powder in its bearing on tactics. It strikes me if we have smokeless powder—which I suppose we shall have shortly—that the two contending armies will be able to see each other so much plainer that it will be a much more unpleasant task than heretofore for infantry to advance against any position or against each other, and, consequently, they will more than ever require to be well supported by artillery. And I cannot help thinking that when the critical moment comes for the infantry to advance to the attack, that they will not only expect, but instinctively and eagerly long for the invigorating sound of their own artillery pounding away behind them, to help them in performing their arduous duty. After what has been so ably expounded by Colonel Hale on the subject of tactics, I feel great diffidence in making any remark except to agree with him that unless we study and thoroughly grasp the effect of fire of all arms, *i. e.*, the danger zones created by artillery fire, rifle fire, and machine guns, it is impossible to

arrive at any sound idea of what modern tactics should be. I might also mention that I did not hear Colonel Slade mention anything about the modifying effect of ground upon the effect of fire, and, consequently, upon tactics. This is a very important point, and should be taken into account. I have had a great deal to do with musketry, and I have heard with interest what Colonel Slade has said with regard to musketry instruction. I think everybody must endorse what he says as being perfectly true and good to accept.

Military Notes.



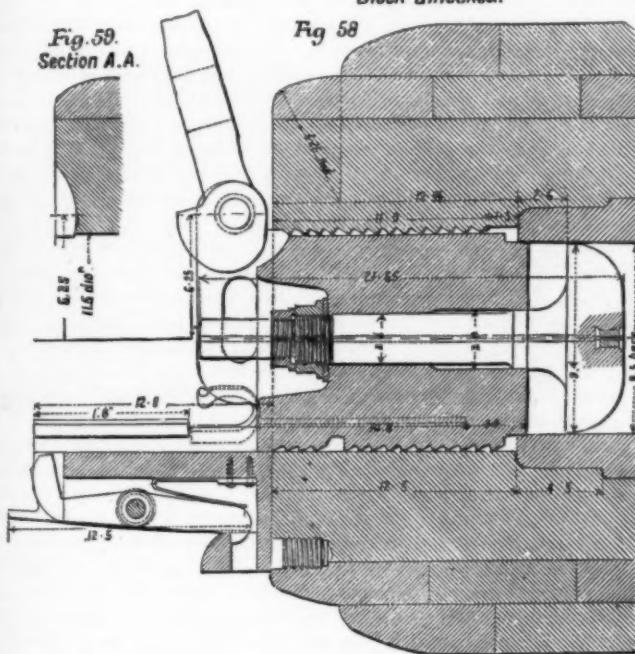
MODERN FRENCH ARTILLERY.

UNITED STATES MODIFICATIONS OF THE FRENCH SYSTEM.

THE details of the French system of breech-loading mechanism, as adapted to an 8-inch steel rifle of the class made for the United States Government at the West Point Foundry, New York, comprise four principal parts of mechanism: the breech-block; the spindle, the inner end of which carries the mushroom-headed obturator bolt; the lever, and the swinging bracket. The breech-block, which, of course, is of tempered steel, has smooth surfaces, over three sectors of the circumference, the other three sectors being threaded; the last thread at the back of the block is left complete to arrest the block at the proper point of insertion when the threads are in a position to engage, one-sixth of a turn completing the locking; this operation of turning carries the block forward .125 in. and forces the obturator pad into place. The diameter of the chamber of this gun is 9.5 in., which corresponds to the diameter of the

end of the breech-block in advance of the threads. The maximum diameter of the breech-block seat is 11.06 in., that measured to the bottom of the threads is 11.04 in., and to the top of the threads is 10.50 in. The total depth of the block seat is 12.5 in., of which 11 in. are occupied by the threads. The thread commences about .8 in. from the rear end of the block, the pitch being .75 in. Two of the sectors have the threads interrupted by a recess nearly 1.5 in. wide; this is to receive the corresponding projections on the bracket to hold the block when the breech is open. The rear of the block is formed with a tapered recess 3.65 in. deep, 6 in. in diameter at the back, and 5 in. at the front part of the recess; further the block is bored through with a central hole, 2.46 in. in diameter, to admit the spindle carrying the obturator head. Curved handles are formed symmetrically on each side of the block, and these, with the lugs to which the lever is attached, are cut from the solid piece of which the breech-block is formed. The spindle is clearly shown in Fig. 58. The mushroom head is 2.9 in. thick, and its normal position is somewhat less than 3 in. in front of the block, which allows space for the gas check; the diameter of the head is 9.4 in., allowing a clearance of .1 in. in the powder chamber. The spindle, where it joins the head, is 2.995 in. in diameter, and passes into

Block unlocked.

Fig. 59.
Section A.A.

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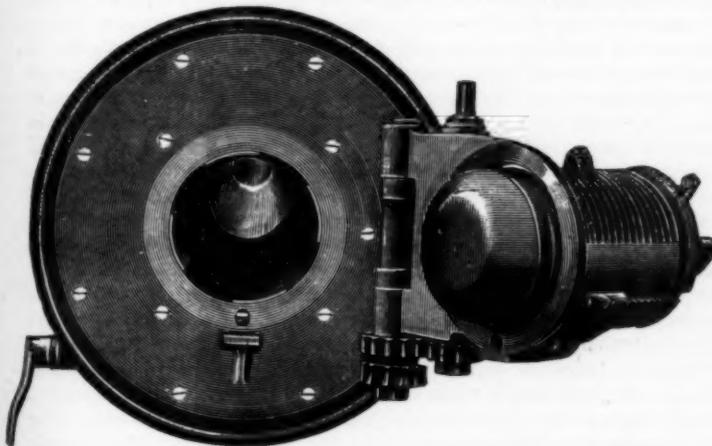
the hole in the block, which for a length of 5 in. is 3 in. in diameter. The enlarged size of the spindle is only 2.75 in. long, beyond which it is reduced to 2.46 in., as far as the threaded end at the rear, which is of two diameters, as shown. Two adjustable nuts and a copper washer are placed on this part of the spindle within the recess in the block. The position of these nuts is regulated by the thickness of the gas check pad, and they have reverse threads to lock the spindle. Beyond these nuts the spindle is extended for 3.65 in., and with a reduced diameter of 2 in. The spindle is drilled on its axis from end to end, to form the vent; the diameter is .2 in., except in front, where the mushroom head is bushed with copper and the diameter is reduced to .10 in. The lever is pivoted and supported between the handles of the block by a bolt that passes through the lugs provided (see Fig. 58), and around which the lever revolves. This lever has three functions: When the handle is upright it serves to revolve the block, either for locking or unlocking; when the block is turned to the locked position, and the lever is thrown down, the eccentric at its hinged end enters a recess cut in the body of the gun and locks the block; and when it is desired to draw out the block after it is unlocked, a downward pull on the end of the lever forces the eccentric against the breech of the gun, and starts the block. When the gun is closed and locked, the position occupied by the lever is that shown in Fig. 58, the lower part of the handle being caught by a spring attached to the bracket.

The swing bracket is that part of the breech mechanism which serves to support the block when it is withdrawn from the gun, and on which it can be thrown back out of the way for loading. The bracket is attached to a hanger which is bolted to the breech of the gun; the top and bottom of this hanger has projections through which passes a hinge bolt and secures the bracket to the hanger.

The bracket is a strong casting, the end where it is secured to the hanger being 9 in. deep, and drilled for the hinge bolt to pass through. The bearing table is 12 in. long, and is curved accurately to the form of the breech-block; at the outer sides are two projecting guides of a clutch form. The level of the table coincides exactly with that of the bottom of the breech-block; the positions of the guides correspond with those of two grooves cut longitudinally in the block. Flanges beneath the table serve to strengthen the bracket and to carry the latch, which is an important detail in the mechanism. When the bracket is turned so that the inner face of the table is in contact with the breech of the gun, and the breech-block is unlocked and started, it can be pulled out by hand upon the bracket, the guides controlling the movement and holding the block steady. The latch, which is shown in position in Fig. 58, serves the double purpose of holding the bracket fixed, while it is in position to receive the breech-block, and afterwards of keeping the latter in its place when the bracket is swung back. The latch is hung on a pin about the middle of its length, this pin passing through the flanges underneath the table; a bent spring underneath the table presses on the top of the latch and tends to hold it down. When the bracket is swung round to receive the breech-block, the inner end of the latch, which is formed with a catch, rises over a curved stop screwed into

the breech of the gun, and when the bracket is in its final position the latch falls into a recess in the stop, and keeps the bracket fixed. When, however, the breech-block is fully withdrawn, the outer end of the block strikes a finger projecting from the other end of the latch, lifts it from the recess in the stop, and as soon as the bracket is turned, the bent spring throws up the latch, engaging the finger with the end of the block, and holding the latter part. When the bracket is again swung round for closing the gun, the reverse action takes place.

The operation of the breech mechanism is as follows: The block being locked, and it being desired to reload, the lever is pulled upwards through an angle of 180 degrees, and when in this position it is turned round through one-sixth of a revolution, when the pin on which it is mounted



strikes against the stop provided for the purpose; the lever is then pressed downwards to start the breech-block, and it is then lowered until its end rests against the rear of the bracket, which has been brought against the breech of the gun, and is held by the latch as above described. The block is withdrawn from its seat by pulling the handles, the relative positions of the various parts being such that the grooves in the block take on to the guides on the bracket. A sharp pull is required to fully withdraw the block, and when the latter arrives at the end of its travel, it strikes the latch, becomes locked, and at the same time releases the bracket, which can be swung back clear of the bore. After the charge has been inserted in the chamber, the bracket is turned back, and on coming into position is locked by the latch, which at the same time releases the breech-block. The lever is then raised, and the block is slid forward into its seat until the first thread strikes its bearing; the lever is then turned through one-sixth of a revolution, and the block is locked, the operation advancing it through .125 in.; the lever is then pulled down till the lower end is caught in the spring. It should be mentioned that in this arrangement a gas check fuse is em-

ployed, and that the obturator pad is made of the usual mixture of asbestos and suet.

The Canet System.—The company of the Forges et Chantiers de la Méditerranée, which has, during the last few years developed, near Havre, a very large and important gun factory under the general direction of M. Canet, has perfected a system known by the name of the director of the works, and which comprises many important modifications of the standard French system. The guns of large and small calibre made at these works are known by the general title of Canet ordnance, and as we shall see later on, they possess many details of novelty and interest. Confining ourselves for the present to a general description of the breech mechanism, we find that the Canet guns both for naval purposes and for coast defense, are fitted with breech-loading devices on the stripped screw system, but into which many improvements have been brought. Obturation is always effected by means of a modified De Bange plastic wad of a special form, which is designed to avoid any hardness or inconvenience in working, and which in varying sizes is used for guns up to the largest calibres and highest powers. In certain cases the stem of the head holding the wad in place is fixed, and the head instead of being mushroom-shaped is in the form of a ring, but with this latter type the stem is movable with the head; by this arrangement, while the same pressure on the breech-block is maintained, an increased pressure is thrown upon the obturator, and as a necessary consequence, a better obturation is secured with low charges—a very obvious advantage. The mushroom is attached to a movable stem, which passes through the axis of the breech-block. This stem, which is drilled through for the fuse, is formed at the rear end with an enlarged opening, the front being bushed; the spindle changes its position according to the extent to which the obturating pad is flattened. Firing the gun is effected by means of a bolt composed of two parts, one of which slides in a groove in the ordinary manner; this circular groove is cut on the rear face of the breech and the tail of the bolt engages in it. The other part of the bolt, following the axis of the gun, is connected to the first by a slide. This second part of the bolt can be made fast with the movable stem by a piece, in which, however, it is free to slide easily when it follows the movement of the bolt. From this arrangement it follows that that portion of the bolt mounted on the movable stem is free to follow all the movements of the latter, while it remains at the same time in connection with the first part of the bolt on which are mounted the percussion and safety devices. The firing mechanism consists of a hammer which is movable around an axis, and carries at its tail end a small roller which is controlled by a spring. The detent is formed by a special forging, on which are placed four fingers; these are mounted parallel to the axis of the breech. The first finger carries the ring of the firing cord, the second takes a bearing when the hammer is lifted, and under the action of a spring, in a lateral recess cut in the side of the wing of the hammer, prevents the latter from falling upon the fuse. The third finger opposes this by stopping against a projection on one side of the hammer, and so prevents this latter from coming in contact with the percussion fuse, if from any cause it becomes released without having been pulled by the firing cord. It is only

when this cord is drawn that the projection is removed and allows the hammer to strike the fuse. The fourth finger, which engages in the groove of the breech-lock, prevents all movement of the axis of the detent so long as the bolt is not in its proper position and the striker is not exactly in range with the fuse. It is only in such a position, when the fourth finger is opposite an enlargement made for this purpose in the slide of the bolt, that the detent can act and the hammer fall. During the rotation of the breech-screw the tail of the bolt remains engaged in the groove formed in the body of the gun, and the bolt is thus kept absolutely fixed. It is only when the breech is completely closed that the enlargements made at the upper and lower ends of the groove allow the bolt to be raised for putting the fuse in place and to be afterwards lowered to make ready for firing. This system of breech-block is thus provided with a triple safety apparatus, because the gun cannot be fired: 1. So long as the breech is not closed. 2. So long as the striker is not exactly over the fuse. 3. Firing is impossible except by pulling on the firing cord. All parts of the mechanism are moreover very simple, easily cleaned and maintained, while the working of the system presents very little inconvenience. The working lever pulls over, and is formed with a cam which, when the breech is closed, holds the block firmly locked. When the threaded sectors of the block are turned so as to be clear of the threads in the bore, by pulling over the lever the same cam which takes a bearing against the body of the gun assists in slackening the obturator in the usual manner.

For the manipulation of the breech mechanism in heavy calibres, special appliances belong to the system above described, which allow the man serving the gun to carry out all the various operations by means of a single lever which is turned only in one direction. The rear face of the breech-block has fitted to it a toothed sector gearing into a rack carried upon a movable nut mounted on a vertical screw which is attached to the console. When the screw is turned, the nut rises, and the rack acting upon the toothed sector turns the breech-block. When this movement has been carried sufficiently far to release the threads of the block from those in the bore, the nut is stopped against the upper bearing of the screw, which then actuates the pinion which is cut with heliocoidal teeth, and attached to the nut; this pinion gears into a rack cut in the side of the breech-block and withdraws it from its seat in the bore. Whilst this screw is being turned the tail of the bolt that carries a small roller rises up a curved path fixed upon the back of the gun. As the bolt rises, the tail of the hammer comes against a stop that forces the dog to lift and produces an automatic safety arrangement. When the screw has arrived at the end of its travel, the pinion butts against the extremity of the threaded portion and becomes fixed. A bolt upon the console of the gun is thrown out and the whole system swings around the axis attached to the gun; the arrangement of this console bolt is very simple and no springs are employed. The pivot has mounted on its lower end a pinion which is turned by means of an endless screw upon a shaft worked by a crank. The various operations can be performed either by hand, by means of hydraulic apparatus, or by belt transmission. The breech-block is fitted with a triple safety apparatus, which makes it impossible to

fire the gun: 1. Until the screwed part of the breech is not completely home in the bore. 2. So long as the bolt is not immediately over the fuse. 3. Unless the firing is performed by drawing on the lanyard. The great advantage of this system is that it can be manipulated in every position of the gun by only one man, and by turning a crank always in the same direction. The operations are, moreover, easy and rapid on account of the convenient arrangement of the different parts, and especially on account of absence of complicated mechanism. The system has been adopted by several countries—Japan, Greece, Chili, etc.—both for naval and coast defense guns.—*Engineering*.

RANGE-FINDING: ITS DESTINED EFFECT ON TACTICS.

A lecture on this subject was delivered at the Royal United Service Institution by Lieut.-Col. A. W. White, R.A., Instructor in Range-finding, Aldershot. Colonel White began by explaining that he did not intend to weary his audience with the technical details of range-finding instruments, still less to propound any original theory of tactics, but to submit the subject of range-finding as a satisfactory solution of certain military problems of primary importance, and with this end in view to state concisely what can now be accomplished by its aid.

In the first place the lecturer explained some prominent features in the tactics of the present day, which are distinctly traceable to the difficulty of correctly estimating time and distance on the field of battle, and showed that every arm suffers a distinct loss in its want of power to judge of distance and speed in military operations, and that in consequence the tactics of infantry are dwarfed, those of artillery are distorted, machine-guns are wasted and cavalry are blindfolded. Range-finding is the remedy which the mechanical genius of the age offers us for the tactical difficulties it has itself created. Range-finding has not, as is generally supposed, been under trial for years, and it is, in fact, only just beginning to be tried now. Range-finders have; but that is a very different thing. Range-finders, however perfect, no more create a working system of military range-finding than horses constitute an efficient cavalry or rifles a trustworthy infantry. Range-finding instruments will be found in endless variety in England and on the Continent—over a hundred designs, some good, some bad, some indifferent; but range-finding as a military system exists in the British army only, and only in one branch of it—the horse and field artillery; moreover, in that even it is as yet but in its infancy, and in consequence on a more advanced footing in batteries at home than in batteries abroad. Much remains to be done; still much has been done since 1883, when the first step was taken toward method and uniformity in this matter, and now, whatever our shortcomings may be, we are at any rate far ahead of all the other European armies.

Field-range-finding has for its main object to place every one on the battle-field in the position of being always at one end of a measured range with their objective at the other end. Speaking generally, range-finding may be divided into two classes—1. Deliberate, for observation of fixed objects at all ranges. 2. Instantaneous or semi-instantaneous, for stationary

or moving objects at the shorter ranges. As a good example of deliberate range-finding, the lecturer gave a short *résumé* of what can be done by means of our service artillery instruments; and, as a fair specimen of instantaneous range-finding, he described certain results recently obtained at Aldershot, using our old service infantry instruments. The system of range-finding introduced some years ago into the drill of the Royal Artillery, horse and field, and which is still our regulation system, is limited to the observation of stationary objects by daylight. The point of observation may be either in the target itself or in something noticeable near to it. One man performs the whole of the optical work; but he is helped by an assistant, who is qualified to take his place if need be. Great accuracy at long ranges is the chief desideratum; this is, however, limited by certain restrictions which apply to all instruments carried by mounted men, and required to be used under service conditions. Extreme importance is not attached to the element of time, because it is not intended that the range-finding should, as a rule, be performed when either the batteries or the range-takers are under fire. For the first artillery positions, the range-finding should be completed while the batteries are still in column on the roads or assembling preparatory to taking up their ground. For later stages of the action, it is provided that whenever a move becomes necessary the range-takers should ride in advance, accompanied by an officer, to select the new positions, and so have the ranges all ready for the guns as they come up; this duty being performed under cover—that is to say, in such a way that the advance parties may not be seen by the enemy constituting the new target or posted near to it. Range-finding is, of course, unnecessary for artillery in action against large targets at very short distances. The range-takers of batteries at home have recently been all trained in the School of Range-finding, and have passed an examination which insures that they work to an average error not exceeding 2 per cent. (20 yards per thousand), up to a range of 5000 yards; always provided the object can be distinctly seen by the naked eye, or in the small telescopes belonging to the instruments.

Nothing is more difficult than to say exactly how long to allow for finding any given range, so much depends on local circumstances; but when working on open ground, with no difficulty as to cover or light, the time may, as a rule, be reckoned to be two minutes for 1000 yards, three for 2000, and so on, adding a minute for every 1000 yards. This does not, however, include the time occupied in choosing the position for the battery or in selecting the target or pointing it out to the range-takers, nor does it allow for a second observation, whereas there are many cases in which a repetition of the work (by a second range-taker, if possible) is most desirable. On the whole, therefore, it is useless to pretend that our artillery range-finding is a rapid process. All we may say is, that it takes no longer than ranging without instruments, and that it draws no fire and wastes no ammunition.

Colonel White then touched upon some recent advances in range-finding by novel methods which do not form part of the compulsory course for range-takers, but which represent no small part of the work of the School of Range-

finding during the last two years. The range can be found of any stationary light seen at night. Not only can camps and bivouacs be brought by this means under fire at night, but night marches of moderate extent can be exactly regulated. All that is necessary is to base the orders for the march on a reference to one or more fixed lights, and to supply each independent body of troops with a map and a prismatic compass, in addition to the range-finding equipment, which for this purpose includes a dark lantern. Then, whenever the question is asked, "Where are we now?" the range to, and the bearing of, the light is noted. Reference to the map then at once identifies the spot of ground arrived at.

In 1888 it was necessary, for some experimental practice, to devise a method for finding the range of a captive balloon in motion. This was a most fortunate occurrence, for not only was this done, but a way discovered of finding the range of other moving objects with fair accuracy and considerable rapidity. The ranges of the balloon were easily recorded twice a minute, with an average error of less than 3 per cent., and the balloon, in consequence, was quickly brought to the ground by the fire of a single 12-pounder gun at 4000 yards range. All last summer the range-finding classes were constantly exercised in the observation of balloons and of troops in movement, and no difficulty was experienced. The method, however, needs a few minutes' preparation, and the range-finding equipment of two batteries is necessary.

The ranges of intermittent lights (limelights and electric lights) have also been taken without difficulty, by combining the range-finding of two batteries.

Here it might be asked why we have not hastened to graft these new methods on the regulation drill of the artillery range-takers. The reason is this: Some time before these were even thought of, a new range-finder, which is called the field telemeter, was tried and approved for future supply to the field artillery, and now we are just about to get that supply.

There is at this moment no complete range-finding system for infantry, but range-finders are very generally used by officers as auxiliary instruments. In our army, there are two distinct service patterns, and every regiment of cavalry and battalion of infantry is allowed a set of either of these as a part of its fighting equipment, and a second set of the same pattern for instruction. The School of Range-finding exists, however, for artillery only, and there are no trained observers in the cavalry or infantry corresponding to the artillery range-takers. For this reason partly, and partly because the instruments have been applied in the service only to the observation of stationary objects, range-finding has as yet no real footing outside the artillery. But there are indications of great change consequent on the introduction of the new rifle and the expectation of smokeless powder. Already the subject has been taken up officially, and there is likely to be very soon a new pattern infantry range-finder especially suitable for the instantaneous observation of moving objects, and superior to anything we have now.

The lecturer then detailed the manner in which in 1886 the service infantry range-finders were adapted to the fire tactics of infantry, and asked his audience to admit that, as we can do so much already with the materials at hand, we are likely to do much more in the future, when both in-

struments and methods have been improved, as there is every reason to suppose they will be. Coming to the subject of the effect of range-finding upon tactics, the lecturer disclaimed all pretension to rank as a prophet, but pointed out some of the immediate consequences of range-finding, and recorded his opinion as to the direction in which we shall be gradually led by the adaptation of tactics to these novel conditions. To commence with infantry, the very first effect of the establishment of a working system of range-finding will be a marked increase of confidence in the rifle, which will react with beneficial effect upon the minds of the men. Marksmanship will be an accomplishment more highly prized than it has ever yet been, because collective skill will once again be able to overcome the mere power of numbers. And of all nations we English will most benefit by the change, for though our numbers are small our personnel is splendid. Have we not among us the best shots in the whole world? The certainty of a knowledge of the range at all times will make it worth while to be able to profit by that knowledge, and there will thus be a twofold improvement, which will enormously extend the zone of reliable fire. Concurrently with these changes there will probably be a distinct economy of ammunition, for it will have a most sobering effect on the soldier to be accustomed invariably to wait for a word of command, which again he knows depends upon a reference to the records of instrumental observation.

As regards infantry, then, we may say that in consequence of range-finding the shooting power of the men will be brought up to the level of the capabilities of the rifle, rapid fire will never be thrown away, continuous fire will be maintained on moving objects, ammunition will be economized, musketry encouraged, and confidence re-established. And it is worth notice that the introduction of smokeless powder will favor these tendencies, and go far to eliminate all remaining elements of chance. As to the effect of range-finding upon artillery, assuming that artillery will eventually possess, in addition to its means of deliberate range-finding, some method of instantaneous observation of troops in movement, it will then enjoy the advantage of its full range, and also be able to operate in the infantry combat without any great sacrifice of either men or horses. Range-finding will do more for machine-guns and quick-firing guns than for any other. By its aid machine-guns will probably become a separate arm, and will at all events, fulfill an entirely new and more or less independent rôle.

The tactical changes which Colonel White considered might follow the acquirement of the new powers indicated are as follows:—1. Extensions from column of route will have to be made at far greater distances from the point of attack than is now necessary; this on account of the increased effective range of artillery. 2. The artillery duel will commence at the extreme range of the guns, unless the nature of the country admits of an advance under cover. 3. No general advance will be possible until the artillery duel has been decided, because—4. Artillery will be much more formidable to infantry and cavalry at long range than it has ever been before. 5. The side which succumbs in the artillery duel will be unable to undertake the offensive except in counter-attack. 6. Machine-guns will probably act in battery. 7. Those of the defense will delay the advance of the attacking infantry.

8. It will be necessary to crush them by artillery fire. 9. Machine-guns will, however, generally silence field artillery within their own zone of effective fire. 10. In all infantry attacks machine-guns will assist, and will be particularly directed against batteries unmasked at machine-gun ranges. 12. Artillery will still continue to support the attack effectively, though it will rarely need to advance to infantry ranges. 13. Frontal attacks on prepared positions will be rarely possible, and flank movements will have to be carried out on the arcs of very great circles. An infantry attack, however, when it is made, will be a far more deliberate operation than is dreamt of now. As regards formations of infantry, the lecturer hazarded the conjecture that the chief object in future will be a maximum delivery of effective fire, and that the tendency will be towards the old English method of getting breadth without depth; a compact, not an open fighting line, fed by supports in extended order at distances so adjusted to the range of the opposing fire as to ensure a minimum sacrifice. 14. Some important general results may also be expected. For example, balloon reconnaissance will be found more than ever necessary, but it will be a far more difficult and dangerous duty to carry out than it is now assumed to be; night marches will be more frequent, especially marches to secure positions for the next morning's operations; electric search lights will draw artillery fire, and so will signal lights; camps will be unsafe at night if any fires or lights are to be seen.

In conclusion, Colonel White added that he knew he was liable to be told that his ideas were unorthodox, according to the standards of 1870, and that with respect to the value put upon range-finding, foreign military opinion was against him from first to last. To this he replied that progress has ever defied prescription, and that, as to foreign opinion, what passes for it in England is often spurious and generally obsolete. The Germans are on the point of abandoning their entire system of battle tactics in consequence of the introduction of their new rifle. Will they not quickly accept the only means possible of properly focussing the long-range fire upon which they now propose to defend in attack as well as defense? Shall we in England adhere blindly to precedents already discarded by those who created them? The harvest of 1870 was indeed bountiful; but may we not perhaps glean too closely in the fields from which the reapers have so long departed?

—*United Service Gazette.*

HIGH EXPLOSIVES AGAINST EARTH WORKS.*

CORRESPONDENCE TO THE EDITOR.

Sir :—In the *R. E. Professional papers*, Vol. XIV., in the valuable *résumé* of the Lydd Experiments of 1888, there is one question of profound interest to the corps, which Major Clarke disposes of as follows :

“ There never was any reason to expect greater effects against earth parapets from the use of high explosives, but it is satisfactory to know that, in this sense at least, melenite possesses no supernatural powers.”

In opposition to the above, I quote the following from Major-General Brackenbury's *Field Works*:

“ It appears certain that some high explosive, to be used in common or

* From the *Royal Engineers Journal*, April 1, 1890.

even in double shells, will turn out to be the reply of the attack to the modern development of defensive field works."

"High explosives as bursting charges for shells have been found capable of actually clearing away everything in the shape of earthworks. It is to be hoped that the British artillery will be provided with some such explosive before our next great war. In this direction * * * seems to lie the future power of field artillery."

The above two opinions are sufficiently explicit to be seen to be diametrically opposed. It would be very valuable to have further information from the experiments of Lydd, or elsewhere, to support the opinion that Major Clarke gives us. I am, etc., A. E. HAYNES, Captain, R. E.

THE TRAINING OF THE GERMAN CAVALRY AS COMPARED WITH THAT OF THE ENGLISH.

At the Royal United Service Institution, a paper on this subject was read by Major J. C. Ker Fox, late German and English cavalry.

The lecturer, observing that on October 1 the recruit in the Prussian cavalry commences his task of learning to be a soldier, and on the 15th of the following April is expected to be sufficiently trained to take the field, proceeded to describe the course a recruit is put through. The first inspection by the colonel of the regiment takes place about January 23. He then sees every squad in the regiment on blanket and snaffle. Whilst the training of the recruits has been going on the one year and two year men have been going through almost the same course of instruction as the recruits. The German cavalry subaltern during the autumn, winter, and early spring, has from seven to eight hours work every day of the week, and though he may get a day every now and then he, as a rule, cannot expect any longer leave. When the second inspection (about April 15) is over, the captain takes his squadron together for the first time, and after telling off the sergeants and men to the horses they are to ride during the remainder of the season (which in most cases are those they have ridden during the winter), commences a regular course of squadron drill, which lasts from five to six weeks. This is not what in England is described by the title "squadron course," but is limited strictly to drilling the men in the ranks of the squadron, and teaching each as a unit of the squadron to take part in any and every evolution it may be called on to perform. After the first week or ten days, the captain, towards the latter part of the drill, takes all four troops together, and, gradually lengthening this period until the last few weeks before the inspection, he drills the squadron the whole time they are out. The accuracy and steadiness of movement at every pace, the wheels into line and column at a trot and gallop, the long inclines at a sharp gallop, the advances in column and line at a gallop, gradually increased almost to the pace of a charge, which are produced under this system with a good captain, are simply marvellous. After the inspection of the squadrons at the end of May, as a general rule the regimental drill follows, which lasts about eight days, and finishes up with an inspection by the brigadier, at which the division and army corps commanders are present. The drill takes in all possible eventualities which might occur on active service. Silent drill has to

be frequently practised, great stress being laid upon it. The men are taught to ride straight to their front at the regulation pace, with no anxious looking to their right or left, under all circumstances to preserve the intactness of their squadron, and to follow implicitly their own troop leaders. If distances or intervals are lost, they are to be slowly and quietly recovered, and thus all confusion and disorder are avoided. In the drill of a Prussian cavalry regiment there is no exciting galloping about of an adjutant with his markers, no appeals to troop officers to give a base, nor exhortations to other squadrons to conform to it, which too often mark the drill of an English regiment. After the inspection of the regiment has taken place, the outpost work commences. In connection with the subject of outpost duty, the inclination now is to do away with the vidette chain as much as possible, and, in place of it, to have a Cossack post—a non-commissioned officer and four men strong on some high point in front of the picket—with a constant system of patrolling over the ground lying in front of it, with an examining party on the main road leading to the picket, thus saving the strength of men and horses, giving the picket more time to get ready, and also a greater power of resistance. Great stress is laid on correct patrol riding. The various sergeants of the squadron having been practised in small outpost schemes, the lieutenants commence their own summer outpost tasks, of which each has to do one, during the outpost period. Each officer has also during the summer to execute a reconnaissance.

The lecturer gave several instances from the last great war of 1870-71, where lieutenants executed good patrol work, and sent in valuable information. After all the lieutenants have worked out a scheme, the captains of squadrons have also to do one each, with a whole squadron, on a larger scale. This brings us up to the end of the outpost period, about the fourth week in August. The colonel of the regiment now gets his regiment together for three or four days drill, which is followed by brigade drill under the brigadier, and the regiment then marches off to manoeuvres, and with these the year's work comes to an end.

Major Ker Fox then briefly referred to the musketry of the Prussian cavalry, how telegraphy is taught, the destruction and replacing of railway and telegraph communication, the swimming of horses, and the entraining and detraining of horses, as also the position and responsibilities of the subalterns and squadron leaders, and the manner in which inspections are carried out, and expressed his belief that conscription is popular, at least in many parts of Germany, it being recognised both as necessary and as tending to improve the youth of the country both physically and morally.

Turning to our cavalry, the lecturer, while professing the greatest respect for and admiration of the British cavalry soldier, provided he is properly instructed in all the duties of his profession by those whose duty it is to lead him in war, considered that our regulations, system of training, and organization conclusively prove that such is not and cannot be the case either with officers or men. He attributed it to three reasons, viz.: to our system of training, which produces inefficient officers, and the absence of a proper system of inspection; to the utter ignorance of the general public about all military matters and military requirements; and to the system by

which our army is administered by politicians, who, sacrificing everything for the sake of a few years' place and power, pander to the wretched and shortsighted outcry for retrenchment, and, through fear of being turned out of office, refuse to apply for the money necessary to render our army efficient, and capable of maintaining the honor and safety of our country. A great deal might be done, the amount of petty crime much lessened, and the recruit made into a much better and more useful soldier, if his troop officer were to associate himself more with his early training and instruction. At least a month or six weeks in the summer should be given up to outpost duty. Theoretical instruction must be combined with practical work, the officers must know every detail connected with the duty of providing for the safety of a force, both on the march and when halted. The men must be told how to ride, how places are to be searched, what to look for, and, finally, how to report what they have seen in the shortest and clearest language. Officers themselves are not thoroughly acquainted with the work, and in fact, many of them know nothing whatever about it. How often are they practised in duties on the march, in outpost work, and in riding patrols? In the two former the number of times may be counted on one's fingers, and in the last—and for the cavalry subaltern, the most important of all—they are never practised. Will any one be bold enough to say that our cavalry compares favorably with the German *as thoroughly trained cavalry* to meet the requirements of modern war? We are not enough in earnest, our officers do not give up the time to learn their work thoroughly, and don't themselves train the men in peace time whom they are going to lead in war. It has not been the custom, and we are very conservative. We must have constant reorganization and improvement. We cannot stand still. We must either improve or deteriorate. If our officers will not face the increased work, let them go, and get rid of the lazy and incapable ones. To those of them who say they are not going to be worked to death, or "hummugged about" by this general or that colonel, and who want to spend their whole time in hunting, shooting, and racing, draw their pay, and give nothing to their country in return, Major Ker Fox would say "Go." Give our officers more responsibility. Let the captains of squadrons and troops *really* command them, and let their promotion depend, almost entirely, upon the results they produce. Finally, the inspections are not frequent enough, nor sufficiently comprehensive. We ought to have every two or three regiments under a permanent brigadier, who would frequently inspect the regiments, and insist on a systematic course of instruction being pursued all through the year, who would back up colonels in getting rid of inefficient officers who either won't work or can't work, and we should then have, in addition to good riders and gallant officers and men, a thoroughly well-trained and thoroughly efficient cavalry.—*United Service Gazette.*

REPRODUCTION OF RECONNAISSANCE MAPS.*

In the last paragraph of Major Talbot's recent paper on "Military Surveying in the Field," he points out the necessity of a portable arrangement for reproducing maps—one that can be used in hot climates.

* From the *Royal Engineers' Journal*, April 1, 1890.

I tried hektographing reconnaissances when on active service at Suakin, in 1885, and found the system would give a dozen good copies with very little trouble. The simplest way to work is to rule lines, dividing the paper on the plane-table into a series of rectangles the size of a half sheet of note paper.

At the close of each day's work, endeavor to have as many as possible of these rectangles completely filled with detail in pencil. Trace in hektographic ink (Judson's violet dye), and apply each sheet to the hektograph, leaving it on five minutes, and then taking off a dozen copies. The tracings can be made on white foreign note paper, and the impressions taken off on half sheets of unglazed cream laid note paper (so as to save cutting to size).

The hektograph can, therefore, be quite small. Paste the sheets on muslin and put it into a card board cover to form a folding map; the advantage of which over a map in one sheet, when required for field use, is obvious.

Half the sheets should be retained and added to the next day's work, thus preserving a connection between the maps sent in. They can be stump shaded and colored if time admits.

There is thus only one copy to be inked in, and any mistakes made in it can be cut out before applying the tracing to the hektograph.

The surveyor should have an assistant, to take off the impressions, wash the hektograph, paste on the muslin, and paint up the roads, etc. Thus, with one man's help he can survey a greater area than by inking in his original sketches and sending them in, because he has no difficulty in joining on each day's work.

The thermometer was generally at 100 degrees by day when the reconnaissances above alluded to were made at Suakin, but I took the impressions off the hektograph during the cool of the evening. They *might* have stuck to the composition by day.

F. MOLONY, Lieut. R. E.

SOME THOUGHTS ON NAPOLEON AND HIS MILITARY SYSTEM.

In these days of study and theory, when almost every month brings forth a new book on tactics, and when organization and administration are continually being altered to imitate those of the latest successful nation on the Continent, it is interesting to cast a look backwards on the system that prevailed in the armies of the most audacious, far-seeing, and capable leader that the world has ever seen. In Napoleon I. genius for war was developed, perhaps, to a greater extent than in any other man who has left his mark on history, and, in spite of the vast victories that have during the last thirty years astounded the world, anything as regards war that met with his approbation, and received the stamp of his talent, cannot fail still to be of absorbing interest. But in war the moral tone of an army, the spirit which animates its men, and the bearing and habits of the officers have an almost equally valuable effect as the mere forms of drill or organization adopted. These, therefore, should likewise be studied, and the system which produced good results in these directions is worthy of our close attention. It is moral force and good discipline which, after all, have in every age won the day, and the same foundations underlie the performances of a Cæsar or of a Na-

poleon. Some very interesting details have been collected and published in Germany recently as to the mode of life and the system of administration which prevailed in the French service under the great man we have alluded to, and have excited considerable interest. A man might become a soldier, it seems, under four conditions: as a volunteer for general service, as a conscript, as a volunteer for the Imperial Guard, or by becoming a cadet at Fontainebleau. Physical capacity was the only qualification necessary to do either of the two first, but to become a member of the Imperial Guard the recruit had to be able to show a private income—in the cavalry of 300, and in the infantry of 200 francs a year; just in the same way as our *sowars* in the Indian cavalry have to show themselves men of some substance ere they are considered eligible. They had likewise to be possessed of some education; while, on the other hand, they might look to gaining a commission as officers after four years' service. There was considerable competition in consequence to gain a place in this *corps d'élite*.

The school at Fontainebleau contained 600 cadets, who paid 1200 francs a year for their education, and who were instructed in topography, mathematics, fortification, geography and drawing, and who did in addition drills and exercises for four hours every day. The best possible officers were selected by Napoleon himself as instructors, discipline was rigid, the fare plentiful, and candidates numerous. These were attracted by the showy uniform; and the magic words about every recruit carrying the *bâton* of the marshal in his knapsack held a glittering bait to the fervid imaginations of the youth of France in those stirring days. Those same words were responsible for much of the feeling that was uppermost in the soldier's mind of the period. The spirit of the gambler was abroad. Men saw that a dashing deed of arms or an act of bravery under the eye of the Emperor might place their feet on the ladder which perhaps led to a kingdom. The leading men of the army had risen from the ranks, and by good luck and personal courage had become dukes and princes, and even kings. Such titles and the spoils of fat provinces were the reward of a soldierlike bearing, and a man felt that it was not for nothing that he risked his life. If the game were dangerous the stakes were high, and Bernadotte wore his crown as a standing example how fortune might favor the brave. Yet, as might be expected, much luxury and extravagance prevailed in the establishments of the senior officers, who, like the successful stockbrokers of our own time, did not trouble much about details of expense after a successful *coup*, but kept armies of retainers and open house. The pay of the common soldier was fifty-two centimes daily, and he also was supplied with bread and firewood in addition. Twelve centimes was deducted from him every day for dinner, and the fare was plentiful, and of good quality. Considering that money at that time represented perhaps three times its present value, the French soldier may therefore be considered to have done well. Ten centimes daily was likewise deducted towards keeping up his uniform and necessaries, and he had always to be in possession of three pairs of serviceable shoes, and three shirts. A man in marching order had to carry his musket, his knapsack, his pouch belt with fifty rounds of ball cartridge, a day's rations, and water-bottle, while every alternate man was burdened in addition with axe

and a kettle. Not by any means an overpowering load, yet it is said that the first night in bivouac saw many of these *impedimenta* cast away. "The war had to support the war," and no magazines or depots of provisions were organized in the front. Therefore the country round was systematically plundered, and excesses and uneven distributions frequently prevailed: one part of a force had perhaps twenty times more than they required, while their next-door neighbors went to bed hungry.

Sutlers and camp followers followed the track of the army in large numbers, and provided additional comfort for men and officers at exorbitant prices. Some of the large Parisian *restaurateurs* had establishments for this purpose at the seat of war, and made enormous profits out of the officers, who usually preferred to pay through the nose for their delicate fare rather than eat the rations they were entitled to. This system of feeding troops was both wasteful and faulty. The inhabitants frequently hid their supplies from the rapacity of the invading swarms, and want was therefore often felt even in rich neighborhoods. The Commissariat department had orders always first to provide for the Guard, and these often fared well at the expense of their less lucky brethren. Naturally, therefore, these gentry were extremely unpopular with the mass of the men, and fully deserved the feelings with which they were regarded by them. Embezzlement and such malpractices on their part were not uncommon, and on the eve of Wagram several were shot by order of the Emperor for selling the rations of his beloved Guard. How his strong head ever tolerated the abuses he can hardly have been ignorant of still forms one of those anomalies which surround his character.

Where churches and picture galleries were despoiled by order of the highest authority, it is not to be wondered at if plundering and marauding were every-day offenses amongst the rank and file. Hundreds of French soldiers were hung for these offenses by the Spaniards during the Peninsular War, and discipline grew so lax that French generals had sometimes to shoot their men for comparatively trivial crimes. It is the fashion to dwell much on the want of discipline displayed during this war by Wellington's soldiers. He himself admitted that matters could hardly be worse than they were with his command in this respect, yet we question whether a more disgraceful state of things did not exist amongst his opponents. It is the custom also to speak of the English force of those days as imbued with aristocratic instincts to a far larger extent than the French. If compared with the armies of Napoleon's earlier days it was undoubtedly so, but latterly, as the Emperor grafted a new aristocracy on the country, the old ways of thought returned, and the sons and relatives of the dukes and princes who formed the Imperial Court gained more rapid promotion, and obtained the best places at the expense of their lower-born comrades, in much the same way as was the custom in royal forces. The vices of a court were likewise soon noticeable. Military service became irksome, and generals grew tired of the incessant bivouac, and sighed for peace and their comfortable Parisian palaces. By the time that Waterloo was fought, all but very few were wearied of the life in camps, and secretly rejoiced at the prospect of a peaceful future. The organization of the Imperial Guard had also a bad

effect on the rest of the army. Their privileges were very great, they marched on the best roads, had the best billets and the best food. Moreover, they were continually spared from fighting, and it was only at the last supreme moment that they were "put in." The best men were selected from the line regiments to fill their ranks, and the Guard flourished to the detriment of the remainder of the army.

In spite of such drawbacks, however, the *morale* of Napoleon's soldiers was, it must be admitted, remarkably fine. They endured hardships patiently, they were wonderful marchers, and were helpful, and equal to emergencies far in excess of what we were or are accustomed to. Their courage in action was above suspicion, and the *esprit de corps* so strong that men who displayed the least sign of cowardice were tried and punished by their comrades afterwards. Napoleon well understood the art of fostering such a chivalrous spirit, and enjoyed opportunities beyond most leaders for carrying out his ideas. After a great battle he invariably held a grand review, when he was received with enthusiastic cheers, and cries of "Vive l'Empereur!" On these occasions, after one of those spirit-stirring harangues, which he so thoroughly understood how to deliver, he inspected the line, and then proceeded to appoint successors on the spot to the places of those who had fallen, and conferred the crosses of the Legion of Honor, or sometimes titles of rank or military position. In this way some lucky regiments which were often with the Emperor during operations obtained an inordinate share of distinctions, while some which had fought equally well under one of his marshals got but little. It is said that on these gala days he liked to ask the officers questions on parade, and loved to get a ready reply, even if it were not quite a logical or accurate answer. He always asked where missing men were, and showed evident gratification if told that they had been killed or wounded with the bayonet. His failing was soon perceived, and in consequence it turned out that an extraordinary percentage were reported as injured by that weapon. Yet even their fire action had become so effective that bayonets were not very often crossed in action, and no one knew this better than the Emperor himself. A noticeable feature of the French soldiers' training was the rapidity and neatness with which they were accustomed to build themselves huts in any standing camp, and the little time it took them to make their dwellings pretty and attractive as well as weatherproof; rows of trees and flowers were quickly planted, and in a few weeks the whole place had a happy and cheerful appearance. During such intervals in hostilities every means was also adopted to restore discipline, to instruct and train the men afresh, to repair and polish the arms dull or rusted by exposure, and to build up once more the fabric of various details that go to compose an army. In spite of the defects we have alluded to, a system which endeavored to foster self-respect and *esprit de corps*, which, while it fully appreciated the value of developing the theatrical and showy aspect of the soldier's life, did not lose sight of the practical ends to be attained, and spared no pains to bring them about, is one which merits our full consideration, and reminds us of much which we might do worse than strive to imitate, even in this age of knowledge and enlightenment.—*United Service Gazette.*

Comment and Criticism.

(The remarks under this head have, except as otherwise indicated, been invited by the Publication Committee.)

I.

"Infantry Battle Tactics."

Col. Thomas M. Anderson, 14th Infantry, U. S. A.

COLONEL ANDERSON said* that he had learned from General William B. Franklin that the history of the three battalion regiments in our Army was this: That before Mr. Lincoln issued his proclamation of May 4, 1861, he appointed a commission consisting of Secretary S. P. Chase, General McDowell and himself, to formulate some plan of Army organization. That they proposed to reorganize the ten old infantry regiments as three battalion regiments of eight companies to each battalion, and to add nine new regiments with the same organization. This would have made fifty-seven infantry battalions in addition to the 75,000 volunteers, and it was thought that this might provide a sufficient force. But when Congress met, the military committees entirely ignored their proposal as to the old regiments but adopted their suggestions as to the new ones.

Colonel Anderson went on to say that just before General Upton went to California, he came to his quarters at Columbus Barracks and spent two days with him, talking over his tactics and changes he thought of making to adapt them to grand tactical operations on a large scale.

He said that Upton favored the three battalion organization for infantry and larger companies, but that they discussed what could be done under the present organization by using the division formation of two companies, as the Germans used their double company columns as a basis for deployments for open order fighting.

The problem was to get the sub-divisions, no matter what they might be called, arranged behind each other in such a way and at such distances that the firing line could be fed by men acquainted with each other and the officers who were to command them. That they figured a good deal on danger spaces and the proper formations in connection with them. That Upton did not see his way clear to adapt his tactics to the new exigencies. The trouble was as to changes of front with either very deep formations or wide extended lines.

With 2000 yards distance between the firing line and the last regimental reserve, the last sub-division would have to swing around too large a segment for prompt action. Then if he gave up his sets of fours, what then?

Colonel Anderson had once tried to talk with General Sherman on the subject of Army reorganization to meet modern tactical problems, and had been met with the proposition that the General of the Army should have his choice of methods and tools. That admitting that there was some force in this observation, he had determined not to volunteer any opinions on tactical questions until he was asked to do so.

* In the Discussion which followed the reading of Capt. McClelland's paper (See p. 509) before the Branch of the M. S. I., at Vancouver Barracks.

Major James Jackson, 2d Cavalry, U. S. A.

Experience in actual warfare suggests to me what are, I think, some objectionable features in the "battle tactics" developed this evening. The mechanical accuracy of the intervals, the relation of the various parts to the firing line, and consequent necessity for uninterrupted observation and communication to reinforce this line and make good its fighting strength, presuppose an open country and undepleted organizations.

There were occasions during the late War when the fighting was in such dense growth of timber and underbrush that the "firing line"—here placed at 150 yards from the first supports—could not have been seen, nor its losses known to the "first reserves," much less to the regimental and battalion commanders. At the battle of the Weldon Railroad a portion of the line of battle ordered to fall back to an entrenched line not over 150 yards to the rear, found this line occupied by the enemy. The undergrowth was so dense that neither party was aware of the presence of the other until they came in collision. I allude to this to show the kind of country it is sometimes necessary to operate in and where in my opinion the tactics explained this evening could not or would not be used.

These tactics seem also to contemplate a full complement of officers and men to the units of organization to make them entirely efficient. After war is once entered upon and a few battles fought, battalions will be so depleted that "platoons" will be insignificant in size and frequently without commissioned commanders. Regiments will be so reduced and officers so few in number that the relation of all the parts of this formation cannot be kept up. Examples were frequent during the Civil War of regiments reduced to an enlisted strength of from 150 to 200 men, with only three or four commissioned officers left. With such depleted organizations, the use of these battle tactics, depending as they do upon the intelligent and efficient co-operation of the chiefs and commanders of platoons, companies and battalions, would be imprudent if not impracticable. Advancing to attack, under these tactics, is, from the relation of the parts, a virtual attack *in open column* and when the skirmishers become well engaged, a large part of the column is within the "dangerous" zone of modern small arms and artillery and the fire failing to take effect upon the "firing line" becomes destructive to the reserves; of course, when not attacking the "reserves" would take cover, if cover was to be had, but this is not possible in advancing. The range and precision of modern small arms seem to have convinced military writers that attacks in column are no longer practicable and can only result in an unnecessary waste of strength. It is believed that the fighting of the future will be in the most open order consistent with strength and cohesion, and will probably be by successive skirmish lines making "rushes" and temporarily intrenching when ground is gained.

Battle tactics which are not adaptable to all conditions of terrain and the varying strength of organizations cannot come into general use, but it is possible that the tactics explained this evening, and which have been studiously thought out and intelligently elaborated, may find their occasions of usefulness. It is well to discuss the subject and exhaust our ingenuity upon it, for it is most important, but I believe that every battle-field will require tactics adapted to its peculiar physical conformation, the strength and condition of the battalions engaged and the composition of the respective forces.

Major Garrett J. Lydecker, Corps of Engineers, U. S. A.

It is a question whether Major Jackson's criticism would not apply with equal force to almost any other system that might be proposed for consideration, yet we must determine upon *some* system in advance of its practical application in war; to this

end careful study should be made of the fundamental merits and demerits of such systems as may be presented by any intelligent student of the subject. Whatever system, or "normal order of battle," be finally adopted as the best theoretically, must be modified in actual war to meet the special conditions and difficulties as we find them on each field of battle; this must be left to the judgment of the commanders and the field, but they should have some well defined and generally accepted "normal order" to start from and come back to—some general principle of action to guide them—admitting that the commander might experience no little trouble in adapting any systematic order of battle to such a field as the "*Wilderness*," it is also quite certain that the student will find it equally difficult—if not absolutely hopeless—to reverse the operation, and develop from the special dispositions appropriate to such a field, a typical or general "order of battle," which shall be susceptible of application in principle to every field.

Captain William E. Birkhimer, A. J. A., U. S. A.

Captain Birkhimer remarked that the tactical principle advocated by the lecturer, of having each organization furnish its own firing-line, supports and reserves, as distinguished from former method of having first one organization in a line of skirmishers, with independent commands in support and again in reserve, seemed to be an improvement. It had the advantage of maintaining one officer in command from front to rear, in the respective tactical bodies, commencing with the company and ending, in this lecture, with the division. This must lead to unity, as opposed under former practice to dispersion of the bodies of troops under any single commander, and it would seem, was advantageous.

The lecturer had spoken of our present infantry organization as obsolete. Now he begged leave to differ from him on that point. He had given considerable attention to this matter, for years, and he had come to the conclusion that, no matter what organization for infantry regiments the situation of foreign countries forced on them, the same conditions he did not believe called for these new organizations here, but on the contrary, pointed to the present regimental organization as the best one for our infantry regiments. In the War of 1812 we tried the plan to a limited extent of having Regular regiments composed of more than one battalion, so organized by law, but the experiment was not a success. The organization which weathered the storm was the ten company regiment and it was adopted as the peace organization in 1815. He did not remember and does not believe that we repeated the several battalion schemes for infantry regiments in the War with Mexico, but we did in the case of the new infantry regiments organized in 1861. We all know the result. After a great flourish of trumpets, the three battalion scheme failed practically. And that war should have taught us what we can do and what we *cannot* do, in regard to military matter in all its branches.

The truth is, in this country, the theory that we should have an expanding system for the organization of the Regular Army, so that the twenty-five thousand men of the peaceful to-day may in the war-like to-morrow become two hundred thousand regulars or any like that large number, seems to be fundamentally vicious, as well as opposed to all our experience. The fact is, the expanding scheme does not work; the small Regular Army does not, and in times of war never has expanded. There are several reasons for this. First, during war, although we make use of all our Regular officers, but principally on detached service, the men who go out to fight—the great mass of them—go into the volunteers. The volunteer regiments do the expanding which the peace theory mentioned assigns to the Regular Army. The volunteers go to war alongside of their friends and neighbors. They do not seek the ranks of the Regular Army.

There is another reason for this. The one power in this country is the political. Politicians want to command these new volunteer regiments and they do command them. Now, he would rather see these men commanding a small regiment than a large one, one thousand men rather than three thousand, as they would do if we abandon our present and adopt the plan of three battalions proposed by the lecturer. Regular officers who understand the command and control of men might be had for the command of brigades, of three of these smaller regiments, he has some statistics, taken from the official records, which bear upon what he had said: they show that, during the War of 1812, the Mexican War and the Civil War, the Regular infantry regiments had not more than a small fraction on the average of their strength authorized by law, and this, too, where they happened to be located so that they were not depleted by the casualties of campaign. Now this shows that, as a practical fact, the Volunteer does not seek the Regular Army in time of war. Why then favor the setting on foot for peace an organization which all experience shows us will disappoint the expectations of its projectors in time of war? The small regiment of to-day, with one thousand bayonets, is a compact effective organization, which can well serve as a model for the volunteer organizations, commanded as the latter generally will be by inexperienced officers. Therefore he thought it is not obsolete in fact or theory and should be retained for our Service.

Captain E. J. McClelland, 2d Cavalry, U. S. A.

As stated by Colonel Anderson, General Upton, after an exhaustive study of the principal armies of the world, decided in favor of infantry battalions of four companies each. His great ability, and the favorable opportunities he had to gather information on this subject, should give his opinions great weight. I am not aware that General Upton left any written battle tactics, beyond some formations for the company, which differ materially from those presented this evening. From what he did leave, however, I am satisfied that the general principles he intended to introduce would have been similar to those I have set forth, which, indeed, resemble those adopted by the great military Powers of Continental Europe.

The increased depth of the new formation will require the rear reserves to move over a greater distance than in the old, if a change of front becomes necessary, but the contents of my paper, together with what I shall state further on will, I think, make it clear that such depth is necessary. Being divided into comparatively small bodies, the reserves will be able to move with greater facility than was possible when massed in close and deep columns. But we must not overlook the fact that a general who permits himself to be placed in a position where a change of front must be made under the fire of the breech-loader, has allowed himself to be placed at such great disadvantage as to almost eliminate any reasonable hope of success. In former wars we hear much of changes of front made in full view of the enemy, but the troops engaged therein were not subjected to the murderous fire they would encounter in a like movement to-day. The range and accuracy of the modern fire-arm precludes extensive manoeuvring on the battle-field, especially when the enemy cannot be brought under a similarly heavy fire.

In reply to the remarks of Major Jackson, I invite attention to the fact that the long range of the rifle of to-day brings contending forces within the danger space at distances greatly beyond those which existed in former wars, even in our last one. To place more men on the firing line than can do effective work at the long ranges, would simply cause unnecessary loss. In several parts of the paper under discussion stress has been laid on the importance of making the distances between the successive lines vary with the inequalities of the ground, so as to take advantage of any convenient

cover. If the country be open, it is directed that the company supports remain with the company reserves until the firing line is one thousand yards from the enemy; this places the support three hundred and fifty yards in rear of that line, and will remove it beyond the danger space of the fire directed at the first line, for it has been discovered that the extreme probable limits of such space resulting from an infantry fire directed at a distance estimated at fifteen hundred yards will be four hundred yards. Such distances, of course, will vary with the change of small-arms. If the country be close, the support should take advantage of it and move nearer the firing line. When the latter has closed to a thousand yards from the enemy, the support, even in an open country, must draw closer to it; in order to give prompt assistance to the front, to make or to meet a flank attack, and to afford moral support. As men begin to fall at long distances from the enemy, there should be reinforcements conveniently posted from which to draw material to replace these losses, and to give confidence to the men on the firing line, who would doubtless become discouraged if compelled to advance from one-quarter to half a mile under a constantly increasing fire without the moral support derived from knowing that assistance was close at hand. Again, the regimental and divisional reserves must be placed far enough to the rear to arrest the usual tendency to call prematurely for heavy reinforcements, as well as to afford these reserves every opportunity to seek cover.

To avoid unnecessary exposure they should not be brought much nearer than two-thousand yards from the firing line; and to be ready to give reasonably prompt assistance, they cannot be posted much farther away.

Whatever might be the merit of the tactics I have here presented, if tried under the conditions mentioned by Major Jackson as having existed at the battle of the Weldon Railroad, it is clear that those in use during the Civil War, and which, to the Major, seem nearly or quite perfect, were not equal to this particular occasion, for by his own statement the enemy established himself one hundred and fifty yards in rear of the troops, on the line of battle, without their knowledge.

Let me repeat, that in a very close country the distances between the lines can be advantageously reduced.

If these tactics presuppose five officers to a company two hundred strong, those now in use assume three officers to one one hundred strong. I admit that the effectiveness of one of my battalions would be greatly impaired if reduced correspondingly to the regiment mentioned as having but one hundred and fifty enlisted men and three or four officers. This is no test of the relative merits of the two systems, for it is a well-known fact that the usefulness of many of the regiments during the Civil War was almost wholly destroyed by such depletion.

When the skirmishers become well engaged, the danger to the rear *échelons* should become less instead of greater, as has been suggested by one gentleman, for the enemy's fire may then be supposed to be aimed with considerable accuracy at the firing line.

With the old weapon, the main reserve might stand in one line at a comparatively short distance in rear of the skirmishers, which, as I understand it, is the Major's plan. Then few men were disabled beyond what may be considered short range to-day. Under those conditions the reserve arrived sufficiently near to the enemy to do effective work with its formation fairly intact, that is, before it suffered much loss. This, however, cannot be expected now, when an infantry fire directed at large bodies of troops can be made destructive at fifteen hundred yards. His "successive skirmish lines," although bearing another name, will probably not differ much from the lines I have mentioned. That temporary intrenchments should be made, when practicable, if the line can advance no farther, is undoubtedly true; but it is not clear why the

successive lines mentioned in the paper cannot accomplish this as well as the suggested "successive skirmish lines." This idea was in view when it was recommended that the men be taught how to utilize houses and fences for cover. To these I will add logs and earth. Field intrenchments, like fire-tactics, might properly be classed with battle tactics, but the limits of my paper would not permit of their being treated in detail.

Captain Birkhimer offers two objections to the battalion organization which has been suggested. In the first place, he disapproves of what he terms the "expanding system" of such an organization, and adds that we must rely on volunteers to do the expanding, and that they will not elect to enlist in a Regular regiment. I admit all he says about the volunteers, but why should more difficulty be experienced in expanding a battalion of four companies from a peace to a war footing (increasing the companies say from one hundred to two hundred men), than in a similar expansion of a ten-company regiment? Certainly no one will advocate sending our Army, as at present organized, into the field without such expansion, or increase of company strength. The battalion organization is for the National Guard and Volunteer, as well as for the Regular. His second objection is that political influence will cause inexperienced men to be appointed colonels, and infers that with our present organization Regular officers might be selected to command brigades. I submit that our experience does not justify us in believing that many Regulars will be selected, and the captain says our last "War should have taught us what we can and what we cannot do." If there is to be any improvement in this direction, we may reasonably hope that it will be in satisfying the inexperienced man by giving him the three-battalion regiment, and thus reserve the higher command for the educated soldier.

It has been stated that in the Mexican and Civil Wars the regular regiments had not, on an average, more than a small fraction of their authorized strength. To this I reply, no war ever saw a more vicious system for recruiting than the War of the Rebellion. Its evils are well known to every one. When recruits were wanted, old regiments were not filled up, but new ones created. If we go into another war with such a system, we must expect to pay for it in an unnecessarily large expenditure of blood and money. Let us be wise, and organize at once for each regiment, or battalion, as it may be, of the Regular Army and National Guard, a depot company, or companies, to enlist, instruct, and send our recruits to the front in a business-like manner.

II.

"Place of the Medical Department in the Army."

Brevet Maj-Gen. Wesley Merritt, Brig-Gen. U. S. A.

MR. CHAIRMAN: I have listened with great interest to Colonel Woodhull's excellent paper and am constrained to say that his arguments for giving medical officers their military titles are most convincing. There is no staff corps which is intimately associated with officers of the line, both in time of war and in peace as is the Medical Department. In my experience there is none which has excited more admiration among the fighting men of the Army than this. In times of danger they are always to the fore, whether it be pestilence or battle that threatens. In times of peace they are our pleasant cultivated companions and every officer of the line counts association with this staff department to his advantage. As a commanding officer, whether of a post or a department, I have always paid close attention to the sanitary reports of the members of the Medical Department and have profited by the practice, and feel sure the Service has been much the gainer by the wise suggestions in these as well as in other matters by the medical officers.

The neglect to give them their proper military titles results from habit rather than design. I for one am willing to be cured of the habit, and I take it the paper we have just heard read is a sovereign remedy. I fear however, as has been suggested, that we will find that the "doctors disagree" in this, as sometimes, in other matters. However, I for one promise, that though I consider the professional designation a highly honorable one, I will cheerfully give the military title when I am sure it is personally desirable.

III.

"Outline of a Manual of Infantry Drill."

First Lieut. George Andrews, Adj't. 25th Infantry.

COLONEL HAWKINS in his outline furnished the essential features of his system and thus presents, as Professor Michie remarked: "An individual solution of the problem offered for our unsparing but honest criticism."

It may be said that so far as the great military Powers of the Continent are concerned, the infantry problem has, since 1886, reached a practical solution and that few important changes may be expected until after another war, except where new appliances, such as smokeless powder, introduce new factors.

Some of the works quoted by Colonel Hawkins were written before this solution was reached, hence they are not altogether applicable to present conditions, for example: the terms loose, individual or dispersed order, have in English been replaced by extended order, which conveys no suggestion of looseness, dispersion or independence; a clear distinction has been drawn between skirmish order and the formation of the fighting line; the individual system has been replaced by the group system; the group, which was the key to the solution of the problem, becomes the basis of the attack formation, maintains control and cohesion up to the latest possible moment and even enables units to mingle without mixing; this system has set at rest certain questions regarding the possibility of approach in close order and the formation and action of supports and reserves, by enabling each fraction, whatever its position, to take the formation best adapted for the time being to its particular necessities.

The unanimous verdict in favor of a system of drill and organization has also quieted, for the present, discussion upon many other points, of more or less importance, which attracted considerable attention previous to the epoch referred to. The military mind now seems occupied in studying the accepted system.

As every one knows, the Continental army organization is based on a company of 250 men, four companies to a battalion and three battalions to a regiment. For action the isolated company is divided into firing line, supports and reserve, but when in battalion into firing line and supports only, the reserve being composed of entire companies. The battalion is the smallest unit which always has a reserve; the regiment and brigade may be formed in two or three lines—always in three lines when operating alone; the division is always formed in three lines. The first line consists of the firing line and supports (fighting line proper), and the reserves; the second line of the reserve battalions; the third line constitutes the general reserve. The main body, so called, has disappeared, because the principles of sufficient force leave it no fixed place; the principle that the fighting line proper should consist of entire units (companies), taken in connection with the requirements of sufficient force, dictated the abolition, noted above, of company reserves when in battalion. The general commander makes known his plans and retains the general reserve under his own control; subordinate commanders conduct the action much as they would if their units were independent, but

always working in harmony with adjacent fractions ; every officer, within his own sphere is expected to take the initiative when necessary to further the general plan.

Colonel Home is quoted (page 360) as endorsing the Prussian system of four battalions ; he admits that a company of 250 men can be influenced by one man, and reasons that as 1000 men is the proper limit for a battalion, four of these companies is correct. He considers that the size of the company should be considerably reduced (the English battalion is eight companies of about 100 men), but one of his reasons is of no effect now that the three-deep formation is abolished.

Conceding that the Prussian company was mainly the result of economical motives does not disprove that it is continued for its tactical advantages. The large company is through thorough training of officers, non-commissioned officers and men, readily controlled by the mounted captain ; it is an excellent unit for out-post and other semi-independent duties ; since it can maintain a firing line, support and reserve, each of considerable strength in the beginning, while a desperate effort of its entire effective might, from a favorable position, hold a considerable force in check ; when fighting in battalion the mixing of different units is delayed and may sometimes be avoided by the abundant resources of the fighting line ; moreover the company feeling of unity and confidence would naturally be in direct ratio to its numbers.

In any considerable war, we must rely upon the intelligence, fertility of resource and adaptability of the people, not upon the military training of the masses ; in the organization of the company it is particularly necessary for us to take advantage of natural tendencies and avoid running counter to them ; one such tendency is to divide into small groups each under an appointed head, for the carrying on of all commercial enterprises which employ as many as a hundred men—therefore the company should be divided into small squads on the group system. Generals are born, not made, they say, but as we descend in the scale, leaders multiply and we may reasonably expect to find for every eight men one who, with backing and some instruction would lead his squad "even to the cannon's mouth." A mob is the extreme illustration of individual organization—the application of the group system transforms it into troops.

We generally favor the twelve company regiment, in which a battalion is four companies—400 men, a regiment 1200 ; the regiment is the unit of administration and command because the so-called battalion has no staff to carry on the work of either. Now the proposed regiment exceeds by 200 the limit set by all authorities for the strength of a battalion and falls short of the strength of a three-battalion regiment by 1800 men, still our proposed battalion commanded by a major would bear some resemblance to a Prussian company with its mounted captain and could be used much in the same way.

Colonel Hawkins claims that his system offers advantages over our present one in the following particulars : 1. The greater rapidity with which a company can fall in, deploy and commence firing. 2. Deployment of skirmishers from line or column. 3. Leg and elbow room in marching. 4. Deployment as skirmishers, execution of the march and stack arms without counting fours. 5. Lying down in line or column. 6. In firing the rear rank man has an interval to fire through. 7. Extension of the front from touch of elbow to any desired front. 8. When extended the company can fire lying down, by file, by company or by rank. 9. Formation for street fighting. 10. Dividing the column of route so as to leave the roadway free. It is proposed to prove that all these advantages are quite as easily obtained from our present double rank formation, in other words, that they are not inherent in Col. Hawkins' system.

By providing for taking intervals between files and distances between ranks, the double rank affords the advantages numbered 3, 5, 6, 7 and 8. The principles of forming line from column of fours (Upton, paragraphs 224 to 228), are readily applicable to

forming line as skirmishers, as in No. 2. By dividing each platoon into two sections we obtain four sub-divisions which can be disposed precisely as in No. 9, if desired, and our present column of fours can be divided as in No. 10.

To meet advantage No. 1, suppose the men rally in double rank faced to the front, without regard to regular places ; in deploying as skirmishers the instructor selects any file as a base, this file moves in the direction indicated, the files to the right and left of the base oblique respectively to the right and left until each gains the necessary interval, then the rear rank man places himself in the interval on the right of his file leader ; being at a halt the base file stands fast and intervals are taken by the flank. This is simpler and quicker than Col. Hawkins' method and no word of command is necessary.

To obtain advantage No. 4. brings us to the group system, in which each set of four is a permanent squad of the company, composed of a corporal and seven men ; when the company assembles, these squads form as is now prescribed for the sections of a field battery ; there is no need of counting fours, each man *sees* his relative position just as he does in the four-deep formation, and column of fours can be formed or arms stacked at once.

So far as the advantages stated are concerned there appears to be no reason for adopting the four-deep formation, but it is still necessary to examine the formation itself, the employment of the ranks and the methods of deployment with reference to the advantages gained in control and fire-discipline.

Each rank is regarded as a group (page 368), but since the platoons are also groups (page 373), we observe that the dividing lines run both parallel to the front and perpendicular to it ; therefore detaching a platoon breaks the rank-groups into halves and detaching a rank may leave a platoon without its chief ; this duplex method of grouping leads to uncertainty or confusion. The distance between ranks is habitually so great as to materially diminish the effect of the fileclosers, who can expect but little aid from the corporals who are posted on the flanks where they have the least influence as factors of control and steadiness. The normal formation does not admit of firing, which suggests the thought that it is abnormal.

The moment a rank is detached or deployed it becomes a skirmish line—the most inflexible of formations and the most difficult of control ; there is no deployment by groups in which the groups take intervals while the individuals in each group keep in close order. The ranks must oblique or march by the flank in single file, in gaining their positions ; there is too much unmasking to be done before fire can be opened by the ranks in rear ; the advance by rushes would be extremely dangerous without intervals between ranks, especially as the ranks in rear advance beyond those firing in front. The retreat by rushes is a feature which has generally been condemned, it being better for the whole company to retire from point to point, making its stands and delivering its fire together.

The necessity for moving on certain designated points is clear, but since every rank may have to oblique or march by the flank before it can take its line of direction, it is possible that the point may not be in view from the new position. It is, of course, necessary to designate the point before the deployment is begun. As the officers and sergeants take their places in the ranks at the preparatory command for deploying they can make no effort at leadership until the ranks have disengaged so as to afford room for them to place themselves in front of their men.

In the deployment forward spreading from the centre, the first rank lengthens the step and the second rank shortens it, to prevent the ranks from interfering previous to disengaging, while the halt is still necessary to enable the fourth rank to arrive on the line ; the third rank is really the base of the movement although in rear of the second

until after disengaged. The deployments spreading to the right or left are not subject to this objection because the base rank is always in lead, but should it be halted before it has moved forward company distance the other ranks would have to modify the length of the step, as noted in the former case, or resort to the flank march. The object in view is to deploy in the simplest and quickest manner; therefore the base group should always be in lead and advance in quick time in the direction indicated, while the subordinate groups move in double time by the shortest lines to their positions, a method that removes all uncertainty as to gaits and renders the command *double time* as unnecessary to the commencement of the movement as is *halt* to its completion.

In the flank deployments from normal line, the first, or leading, rank is the base where the movement is executed toward but one flank; why not make it the base in the deployment by both flanks? The second rank would then deploy by the right flank, the third and fourth ranks by the left.

In the deployment from column of route, it is observed that the deployment right (or left) front into line, throws only one more rank to the right (or left) than is done by the deployment on the centre; it would seem that in the former movement the left (or right) rank should be the base in order to obtain the greatest amount of lateral extension.

Reinforcing by successive lines of skirmishers has the objection of strengthening points already overcrowded as well as those which are thinned out—a fault which can only be met by the group system.

In assembling, the company may form in column of route (page 363) or in normal line (page 366), though how to determine the method to be used in a particular case is not explained; it is clear, however, that there is no invariable assembly formation (the rally is but a rapid assembly), which is a grave error.

The proposition to rally in column of route (pages 371 and 374) on ground just wrested from the enemy seems against all human tendency and equally against the principles of securing the position; the company is confessedly "prepared for orderly manœuvre" but this is not expected at this juncture—"a heavy fire should be poured on the enemy as he retires." To form the company in column, faced to a flank, not only prevents a rapid formation and the possibility of instant fire but implies that a flank march usually follows the occupation, which is absurd.

The captain should, indeed be the rallying point and when he calls, the men should run to him by the shortest line and form successively as they arrive on the nearest flank. There is nothing artificial in assembling in line—cavalry horses have done it without their riders.

In conclusion, it should be noted that the four-deep, or checker, formation is not distinctly American, Col. J. H. A. Macdonald of the British Volunteers ably advocated its merits in several publications some years since and had the merits of the system tested at manœuvres in England. It compared favorably with more ancient methods perhaps, but was not incorporated in the English Infantry Drill of 1889.

IV.

"A Regimental Court of Honor."*

Capt. W. E. Birkhimer, A. J. A.

THE importance of maintaining a high tone of honor among our officers cannot be overestimated; it is absolutely necessary. It is this which distinguishes that class in the community, and the preservation of it unimpaired will alone retain to officers the respect and confidence of the country. Nor, be it happily said, has experience everywhere led to the belief that this "important factor in an officer's" and therefore in the Army's efficiency is being allowed to suffer from neglect, indeed, go by default." Doubtless circumstances arise occasionally which give color to such melancholy reflections. In every community and in every profession there doubtless will be found unworthy members. To expect that the Army will be an exception to this rule would be unreasonable. The best matured system for securing proper appointments is liable to abuse. Materiel originally good may deteriorate. It is possible that unworthy men may be forced into the commissioned ranks of the Army, and, spite of all that can be done to rid the Army of them, they may be kept there. But should such cases ever happen, they will be few and far between. Why cannot the community upon which they are forced, if forced they ever are upon the community, take care of such cases? Certainly no one is compelled to associate socially with them. If such people are treated as they deserve to be, there is no danger to the "honor of the brotherhood of officers" from this or kindred sources. If the mass be good to start with, it will not be polluted in this way.

It is not believed that war fosters universally, or that peace invariably and insensibly impairs, the "honor of the brotherhood." War certainly does develop the noblest traits of human nature; but also its worst. In war the best and basest elements are thrown up to the surface. It takes a long course of purification to purge the system of the deleterious elements. The year 1870 will long be remembered on account of the good work in this direction then done.

If the idea be advanced of having a court of honor, similar to that in Germany, established in our Service, by law, for each regiment, it is not believed that the scheme is practicable. Our legislators do not look kindly on such measures. They have provided means which seem to them sufficient to guard the honor of the military profession. The instrumentalities for giving effect to these means are in the hands of the officers themselves. "Why," they will ask, "do you not make use of weapons already at your hand, instead of asking for others to maintain the honor of the brotherhood? If we should give you increased facilities in this regard, what assurance have we that you will use them to better purpose than you have those you are already entrusted with?" And when the legislators talk and reason thus, what reply can be made? Those would have to make it who favor asking for such legislation, and have faith in its efficacy. Again, it must be remembered that when an officer goes out of the Army, in the manner indicated, in the German and kindred services, he goes to stay. Here he comes back if he so desires, and has sufficient political backing. Is any one dreamy enough to imagine the day is near when political influence will not accomplish this? If so, that person has different notions from some others, who think that the *political* is the only *power* in this country worthy of that name, and it grows stronger apace instead of weaker? What effect upon the workings of the regimental court of honor would this returning to their old positions of officers have, who had been justly punished by the court? Manifestly it would greatly impair the efficacy of that system, just as it now does that of the court-martial.

* See "A Regimental Court of Honor," JOURNAL, M. S. I., No. 44.

How much better would we be off with the regimental court of honor added to the court-martial we now have, than we are with the latter alone? It is not seen how we would be better off with the two than we are with the one.

If it be a sad fact that "the honor of the brotherhood of officers" is being allowed to suffer from neglect, relief can come only from one of two sources, namely, either from without or from within. If from without, it can only be through legislation as before indicated, and this, it has been shown is impracticable; and it is believed to be equally undesirable.

But how about purification from within? This is the only source whence improvement can reasonably be expected to come.

And first, let it be understood once for all, that expectation that unworthy members of the brotherhood will not occasionally be bolstered up by family or political influence to the disgrace of the profession need not be indulged. It is plainly Utopian. No matter how high toned the sense of honor of the brotherhood as a general thing may be, there will thus be sometimes introduced and retained in office those who discredit their cloth.

Taking it for granted, therefore, that these cases are beyond the power of the brotherhood to obviate, however much they impair its credit, particularly with the outside world, let us see if the brotherhood itself cannot, if it be so disposed, remedy the evil indicated, if indeed it exist.

The main points to be looked to are these: first, permit none but first-class (*sic*) gentlemen to receive commissions: second, make them keep up to the same high standard while they retain them. It seems that nearly this whole matter is in the hands of the officers themselves. They admit recruits into their ranks. Excepting a few staff appointees no one receives a commission until his mental and physical condition, moral character and educational attainments have been passed upon by the brotherhood (see Act, June 18, 1878, and G. O. Nos. 5 and 6, A. G. O., 1890 and pars. 23 et seq. A. R.). After he is admitted, the Articles of War and the Army Regulations put into the hands of that same brotherhood the means of keeping him (and to this there is no exception) up in all respects to the same standard of excellence. If, therefore, those are either admitted (except these few staff appointees) or retained whose influence is detrimental to the honor of the corps of officers, who is to blame except the members of that corps? They have the means for getting rid of them, *if they have the nerve*. It is believed, therefore, that the remedy for any evils that may exist, in the direction indicated, is simple, and is this: more care in selecting those who are to be honored with commissions, and, what is more important, increased determination on the part of officers that, to retain those commissions, the holders must show, at all times, that they remain worthy to retain them.

Commissioned officers enter the Army through West Point, promotions from the ranks of the Army, and selections from young civilians. A great majority, in time of peace particularly, come in from the first mentioned source. Fortunately, the professors and instructors at that institution have a just appreciation of their duties, and their obligations to the country. The cadet, subjected to four years of severe mental, moral and physical discipline, comes out of that school, as a rule, so moulded and tempered for his work in the Army that decadence of the honor of the brotherhood of officers will rarely be laid at his door. There are three simple rules to guide officers in their relations with others the observance of which will never permit them to go astray. (1). Speak the truth, though the heavens fall. (2). Obey orders promptly and cheerfully—appealing afterwards if desired. (3). Do to others as you would wish them to do to you. These are not all the virtues to be practised, but from them most others, including proper punctilio, and a high sense of honor, will be found to flow.

With regard to the first two of these three rules, the West Point course of instruction is admirably intended to impress them deep upon the minds of the embryo officers. To lie, there, is the unpardonable sin. And so deeply is this love of truth implanted in the breast of cadets (as a very general rule), that their statements of fact can be implicitly relied upon. This may seem to some people, and to the young gentlemen themselves at first, a matter of not so much importance after all. But ask the old officer, he who has had for years to rely, to a great extent, upon the representations of subordinates, if its importance can possibly be overestimated. He will say that the simple rule, "Speak the truth," is the cardinal military virtue.

The course of discipline there is well calculated to add that other virtue—cheerful obedience of orders. The graduated cadet can generally say, "not my will, but thine be done" to his superior officer, and take great pride in saying it with good grace, and without mental reservation. He takes a peculiar satisfaction in doing what his superiors order, not because he does not like as well as others to have his own way, but because the discipline of the soldier, woven into his fibre, teaches him it is his duty to obey—therefore it is his pleasure.

The third of these rules is not pointedly inculcated at West Point, nor is it anywhere else in the military service. It is one of those moral virtues, based on goodness of heart principally, consideration for others, the very opposite of selfishness, which selfishness military life is calculated, most unfortunately, to develop. But it is one of the virtues that officers should try to cultivate, each in his own breast. Joined to the other two it will make the officer who practices it respected and beloved by his associates. And honor is not likely to depreciate if each member of any brotherhood is respected and beloved by the others, and of these, the respect of others is the more important.

There are some, I will not say a class, whose sense of honor never rises above the standard of the barracks. It should be about as difficult for them to get a foothold among gentlemen as for a camel to go through the eye of a needle, literally speaking. Though many of this kind are called, let few be chosen. Their influence, insignificant though it be, is detrimental, so far as it goes, to a cultivation of a fine sense of honor.

Civilian appointees will receive impressions from, and, as a general thing, naturally enough, act up to the standard of honor set by those whom they find already in the Service.

Upon the whole it seems, after carefully reviewing the military situation, that, if the corps of officers will only make use of those means now provided, they can maintain the honor of the brotherhood at a proper standard, or redeem it if they have inadvertently permitted it to be lowered. If they will not make use of these instrumentalities, what inference can be drawn but that they do not wish to maintain it at a high standard, or do not want it raised when it has thus been cast down.

But in any event, it is not perceived how the addition of the Regimental Court of Honor will be an improvement over the existing system.

Bvt. Lieut.-Col. A. A. Woodhull, Medical Department.

All practical methods of improving the tone of any community, civil or military are to be encouraged. But the meaning of honor differs with every grade in society, from the questionable variety that is said to be found among thieves to the quixotic sort that resents with a bullet a word spoken in jest. To my mind the best definition of military honor is that quoted by the writer from the German Emperor (p. 414). Such honor is not concerned with empty forms, but with the conscientious discharge of duty at all

times and under all circumstances, and with constant personal dignity, not with an artificial formalism. I doubt, however, whether the Honor courts concern themselves as much with failures to meet that standard as with violations of codes more or less factitious.

I cordially agree with Lieutenant Wills, that with us there is too little regard for what may be called the unofficial observance of official etiquette. That is, that officers too freely and unguardedly express opinions of other officers in ways likely to weaken the respect and authority in which they should be held. This is not merely true of juniors discussing seniors among themselves, but of seniors in relation to juniors before those who may perhaps be junior to the one criticised. Every one may properly have his personal opinion of men and measures, but such opinions should only be expressed with caution and never so as to weaken authority. Commanding as well as subordinate officers sometimes sin in this way: who then shall keep the keepers? Undignified or reproachful reference to commissioned officers, not to, but in the presence of, enlisted men is a serious blemish in garrison life. A court of honor could hardly deal with such cases without making more mischief, and the real remedy is greater personal dignity and a more wholesome altruism in the speaker. This in confirmation of Lieutenant Wills' remarks about our looseness of speech (p. 418) is, however, merely by the way.

I think that courts having such functions as proposed would be impracticable in this country. Commissions in a republican and in a royal army represent different service and are held by somewhat different tenures; not that our dignity and honor should be a whit less than theirs. Congress would never authorize, nor would the Army at large accept with equanimity a second tribunal charged with judicial functions and with punitive powers. The office of such a court with us, if authorized, would be less the protection of an officer from insult, that is as a substitute for the duel or for more informal conflict, than to act as a censor upon conduct below caste for a sensitive community. It is not necessary to cite examples. Doubtless in theory a fearless, alert and delicate court of this character would be invaluable. But, as just said, our institutions could find no place for it, and admitting the possibility of its legal existence it would be practically impotent. Insuperable obstacles are our small garrisons, the risk of prejudice and clique, and above all the divergent views of many officers upon points not involving infraction of law or morals. The very difficulty to be corrected, laudable as is the effort, would probably weaken the court.

This varying standard results from the wide social scale through which appointments are made, and the absence of a common training whose uniform pressure would more nearly reduce to a common mould. It would be much better to have no formal expression of opinion than that such a court should indorse or condone a doubtful transaction or one repugnant to a delicate sense.

Were our colonels more fortunate in having their regiments together, and were they all men of such personal example and force of character as by private admonition, or, if necessary, by public reprimand, would hold the reins of decorum tightly drawn, great good might be accomplished. The same in theory should be the status of post and in turn of others, superior and inferior commanders. But here the original trouble recurs and we find ourselves inclosed by a chain with some very weak links.

Beyond the careful cultivation of personal and regimental tone by the milder influences of precept and example, the only although somewhat hazardous remedy, except courts-martial, seems to be for public spirited officers to take individual cases into their own hands. Practically this is a resort to moral vigilance committees. Each case where a vigilance committee is to be preferred to due process of law, is to be decided upon its own merits.

Reviews and Exchanges.

Hand-book of Problems in Exterior Ballistics.*

IN this work Captain James M. Ingalls, 1st Artillery, supplies us with an invaluable treatise on the subject of Exterior Ballistics. Part I., just distributed among the Artillery Arm, covers direct fire, and deals with the solution of problems in this important branch of gunnery. Each problem is solved in general terms, and then illustrated by one or more practical examples in a manner so clear and simple that no artillerist can longer find an excuse for remaining ignorant of the subject. This treatment by practical examples relieves one from the alternative of memorizing long and laborious processes, or wasting much time in relearning them when once more required. The method of obtaining the ballistic constants is so plainly outlined, that for a given gun and conditions their determination becomes a simple matter. A few well-conducted experiments will furnish the necessary data. Under the head of small arms many useful tables are found, and much valuable information relating to the military rifle of the future. This part of the book cannot fail to recommend itself strongly to those interested in this subject. One of the distinctive features of the book is the application of the laws of probabilities to the computation of the absolute accuracy of a gun. We believe this will be of great advantage to gunnery, and will ultimately reduce it to a fine art. The application of least squares, and like methods, to the reduction of ballistic problems is a step towards their higher treatment, and will, without doubt, elevate artillery work to a plane where the scientist and mathematician will play more prominent parts than ever before. Little by little we notice the growing demand for accuracy. To obtain this, all deviating elements must be considered, and corrective allowances made for them. This sentiment manifestly pervades the Hand-book of Problems, where all the elements affecting the flight of a projectile are discussed. Here we find wind, drift, changes in atmospheric temperature and pressure, with the most recent and best methods of computing the values of each in solving a trajectory. In future wars, where the struggle may be to the death, and each antagonist striving for the first fatal shot, none of these apparently unimportant agencies can be neglected. Evidently the author has this view in mind; and although some of the formulas fail to inspire the confidence which practical experience and proof alone can give, they will be of great value in forming a ground-work for further and deeper analysis. In this book a wider view of the subject is taken than that of a collection of "rules of thumb," to be used in the approximate solution of independent and isolated problems, and ballistics begins to assume the form of a science in which the component parts hold certain definite and dependent relations to each other and to the whole. We believe that progress in this department will be great in proportion to an approach to this conception, and that the sooner this idea is firmly grasped the sooner indifference will disappear and be replaced by systematic courses of theoretical and practical investigation.

* *Hand-book of Problems in Exterior Ballistics.* By Captain James M. Ingalls, 1st Artillery. Fort Monroe Press.

The work formulates a growing sentiment, and will soon give it a firm hold upon the future, and at the same time will be an invaluable companion in our efforts to obtain a better knowledge of the principles of gunnery. We believe that the enormous labor expended on Part I. will be many times repaid in benefit to the Service, and shall anxiously await the appearance of the second part.

J. W. R.

War-Path and Bivouac.*

In "War-Path and Bivouac," Mr. John F. Finerty gives most interesting account of the two most important Indian campaigns in the history of this continent, to which are added short biographical sketches of the military history of Generals Crook and Custer. Part I. is devoted to the Big Horn and Yellowstone Expedition under General George Crook, and part II., to the campaign to the British line under General Miles. The whole book is written in a pleasing style and the history of facts occurring under the writer's eyes is more entertaining than any romance could be.

The chapter devoted to the Sibley scout is of intense interest and the following passage giving the brief instructions of Lieutenant Sibley to his men speaks eloquently of the desperate character of Indian warfare.

"Men, the Indians have discovered us. We will have to do some fighting. If we can make an honorable escape, all together, we will do it. If retreat should prove impossible, let no man surrender. Die in your tracks, because the Indians show no mercy."

In the following, the author indicates the method of the greatest Indian campaigner of our age.

"Crook is severe, and I'd rather be with Terry, as regards food, shelter and clean flannel, but he goes for the Indians as one of themselves would do, and has shown that an American army can stand without much growling or the slightest approach to mutiny more than any other troops upon this earth. * * * A large portion of the rank and file was made up of material that covered the British arms with glory in the Peninsula—the never war-absent Irish—and of Germans, whose slow bravery solidifies the Celtic ardor with Yankee coolness and makes the three elements of a military body that to use the words of a dashing American officer, who had accompanied the column from the outset, "would go with the Balaklava six hundred into the mouth of hell, and then brandish their carbines and call upon the Light Brigade to follow them and fight their way out at the other end."

Of the many fights and skirmishes engaged in and of hardships and privations undergone, Mr. Finerty speaks as one who was present through them all and his story as coming from an unprejudiced outsider renders it probably of more value than had it been written with an equally brilliant pen wielded by one who at that time was wearing the Army blue.

E. F. W.

A Catechism on Cavalry Outposts, Reconnaissance and Advance and Rear Guards.

This recent publication of Lieut. E. A. Garlington, 7th U. S. Cavalry, is a valuable acquisition to the military text-book of the trooper and one that it would be well to see in the hands of every troop commander, not only for the instruction of the men under his command, but for the individual attention of the officers. There is much to invite the attention of the cavalryman who may have had but little experience in the methods of offense and defense of a body of which he forms a component part, and

* *War-Path and Bivouac, or the Conquest of the Sioux.* Published by the author at 79 Dearborn Street, Chicago. Price, cloth, \$2 per copy.

also in view of the fact that he may be called upon at any moment in actual warfare to exercise a judgment which will be much aided by such a catechism as Lieutenant Garlington presents to us. This book has been submitted to a capable board of cavalry officers, who highly indorse it, and it has received the approval of Lieutenant Garlington's regimental commander. It would be a wise step to cause it to be placed in the hands of our cavalry officers.

Lieutenant Garlington has made a careful *resume* of many modern writers in compiling his book, and has adapted his questions and answers to the circumstances that are liable to arise, and of which every officer and soldier should be cognizant.

J. B. H.

FOR REVIEW.

Instructions for Courts-Martial and Judge Advocates. By Captain P. Henry Ray, Acting Judge Advocate U. S. A. Omaha, Neb., 1890.

War-Path and Bivouac, or The Conquest of the Sioux. By John F. Finerty, "War Correspondent for the Chicago Times."

The Influence of Sea Power upon History, 1660-1783. By Captain A. T. Mahan, U. S. Navy. Boston: Little, Brown & Co., 1890.

History of the Seventh Regiment of New York, 1806-1889. By Colonel Emmons Clark. 2 Vols. New York, 1890.

Yale Military Lectures. Selected from Series of 1890. By Charles A. L. Totten, M. A., 1st Lieut. 4th U. S. Artillery. New Haven, Conn., 1890.

OUR EXCHANGES.

ARTICLES OF MORE OR LESS MILITARY INTEREST.

ARGENTINE REPUBLIC.

Revista Científico Militar (March, 1890).

Boletín del Centro Naval (January and February, 1890).

BELGIUM.

La Belgique Militaire. Belgian Guns and the Belgique Militaire. Artillery Trials in the Polygon of Brasschaet. Belgian Smokeless Powder. The Naval Powers of Europe. The Superior Council of War. Portable Guns for Artillery.

Revue Militaire Belge. Constantinople and the Balkan Peninsula. History of the Siege of Ostend. Instruction for Recruits of the Siege Artillery Regiments' Indirect Fire.

ENGLAND.

Proceedings of the Royal Artillery Institution. (April, 1890) Siacci's Method of solving Trajectories and Problems in Ballistics. Sound-Velocity applied to Range-Finding. Some Notes on the Swiss Artillery. The English Army in Flanders. (May) Fire Control in Fortresses. Horse Artillery Progress in the British Army. Submarine Mines in relation to War.

Journal of the Royal United Service Institution. (Vol. 34, No. 152) The Land Forces of Australia. The Tactics of Coast Defense. Modern Gunpowder as a Propellant. Range-finding; its destined effects on Tactics. Lessons to be learned from Naval Manoeuvres. The Maritime Defense of the United Kingdom. Medical Service in Modern War. The Shoeing of Horses for Military Purposes.

United Service Magazine. (March, 1890) Some Remarks on our New Military Rifle. An Indian Waterloo. A New Naval Power. The French Official Account of Waterloo. (April) Our War Organization of the Future. Imperial Federation. Has the Naval Defense Act Made England Safe? Waterloo. Our Next Naval Need. (May) England and Belgium. George Leo von Caprivi, Responsibility in War. Waterloo. The Origin of Legends.—II. The Easter Manoeuvres. The Sudan Campaign.

Publications of the Aldershot Military Society. Modern Military Rifles and how to use them.

Army and Navy Gazette (To date).

United Service Gazette (To date).

FRANCE.

Revue Militaire de L'étranger. (March, 1890) The Co-operative Societies in Foreign Armies. The Military Forces in Sweden. The Defenses of the St. Gotthard Tunnel. The German Rifle Model, 1888, and the New Infantry Regulation. The Co-operative Societies in Foreign Armies. The Military Organization at Roumania. The German Navy and the Budget of 1890-91. The New Regulations for the Austria and Hungary Infantry. The English Army in 1889.

Revue du Cercle Militaire. The Russian Officer in the Army and in Society. A Year in Tunis. The Carrier Pigeons and Doves. The Military Institutions of China. The War in Senegal.

Le Progrès Militaire (To date).

ITALY.

Rivista de Artiglieria e Genio (March and April, 1890).

SPAIN.

Memorial de Artilleria (March and April, 1890).

UNITED STATES.

The Century. (May, 1890) The Autobiography of Joseph Jefferson.—VII. Valor and Skill in the Civil War. George Washington and Memorial Day. The Fighting Parson. Institutions of the Arid Lands. (June) The Autobiography of Joseph Jefferson.—VIII. A Word from England on Lincoln. President Lincoln in Petersburg. Lincoln's Visit to Richmond.

Proceedings of the United States Naval Institute. (Vol. 16, No. 2) Report of Policy Board.

St. Nicholas. (May, 1890) The Passing of General Bacon. Six Years in the Wilds of Central Africa. A Submarine Ramble.

The Popular Science Monthly. (May, 1890) On Justice. Sumptuary Laws. Scenes on the Planet Mercury.

The Pennsylvania Magazine of History and Biography. (April, 1890) The Leaders of the Old Bar of Philadelphia. Notes on the Battle of Monmouth. Excitement in Philadelphia on hearing of the Defeat at Brandywine. First Congress of the Scotch-Irish in America.

The North American Review. (May, 1890) The Hatred of England. Soap-Bubbles of Socialism. The Typical American. The Mississippi Floods. Why Cities are Badly Governed. Protection in Canada. (June) The Federal Control of Elections. Criminal Politics. Do Americans Hate England? The Value of Protection.

Bulletin of the American Geographical Society. (March, 1890) On the History of Physical Geography. England Two Hundred Years Ago.

Harper's New Monthly Magazine. (May, 1890) Charge of Cuirassiers at the Battle of Rezonville. Making United States Bonds under Pressure. An ex-Brigadier. (June, 1890) Through the Caucasus. The Enemy's Distance. Range-finding at Sea by Electricity. First Bismarck. Two Points of View.

The United Service. (May, 1890) The Military Schools of the United States. A Modern Battle-ship. Gessie Pasha. Great Commanders of Modern Times.—"Marlborough." A Romance of a Government Coast Survey. A California Pioneer. National Guard Elections. (June, 1890) The Battle Tactics of To-day. Naval Discipline. Frederick the Great. The Trials of Staff Officers.

Transactions of the American Society of Civil Engineers. (January and February, 1890) The Results of Investigations Relative to Formulas for the Flow of Water in Pipes. Cast Iron-Strength Resilience. Tests and Specifications.

Magazine of American History. (May, 1890) Spanish Pioneer Houses of California. Colonel William Grayson. A Century of Cabinet Ministers. (June) Capture of New York. Our Northern Neighbors. A Study of Political Parties.

Monthly Weather Review (To date).

Publications of Department of Agriculture (To date).

Science (To date).

The Army and Navy Register (To date).

Philadelphia Weekly Times (To date).

The Boston Courier (To date).

Home and Country (To date).

Kansas City Times (To date).

Table Talk (Philadelphia. To date).

The Electrical World (To date).

Historical Sketches
of the
Army
of the
United States.

Memorandum.

THE EDITOR is authorized to announce the beginning of the serial publication of Historical Sketches of the Regiments, Staff corps and Staff departments of the Army, referred to in the Circular, Publication Committee, Nov. 10, 1889 (see page 21, front, this JOURNAL). Officers engaged in preparing such sketches are requested to advise the Editor of the progress of their work.

FOURTEENTH REGIMENT OF INFANTRY.

BY COLONEL THOMAS M. ANDERSON, U. S. A.,

FOURTEENTH INFANTRY.

WHEN one of the newly organized battalions of the Regular Brigade of the Army of the Potomac reported to Colonel Buchanan, he said to its commander: "Sir, your men look like volunteers!" The reply was: "That is just what they are." The veteran martinet rejoined, "I will make them Regulars"—and that is what he did.

This little dialogue gives the history, in brief, of the nine infantry regiments added to the Army in 1861. Nearly all the officers were appointed from civil life; the men were specially enlisted for their regiments and, generally, for designated companies by their company officers.

The War Department tried to assign as many experienced officers and as many old soldiers as possible to the new organizations, with the intent that they should act as organizers and instructors. It was hoped that enough could be assigned to leaven the mass and thus make the new regiments reasonably efficient in a short time. But out of eight West Point graduates sent to the 14th Infantry, only three went with the regiment to the field; the others were assigned to other duties; four as brigadier-generals of volunteers.

All the new organizations had about the same experience. The volunteer element was predominant, but by precept, example and environment they soon acquired the traditions and spirit of the old Army without losing the zeal, enthusiasm and resource of the volunteer soldier.

In one of the first battles of the Rebellion, an old officer watched one of the new regiments as it went forward, under a withering fire, with a cheer. The veteran smiled grimly, and said, "They act like mustangs, but they fight like men."

The 14th Infantry was organized under the President's proclamation of May 4, 1861, which was confirmed by an act of Congress of July 29th of the same year. Twice before a regiment designated as 14th Infantry had been organized in our Service. The first in the War of 1812. Besides its field officers, it had its full complement of captains, first, second and third lieutenants, its ensigns, surgeons and surgeon's mates; most of these officers were commissioned from Maryland.

Its first colonel was Wm. H. Winder, who having been appointed a brigadier-general in March, 1813, was succeeded by Col. Charles G. Boustler, who had been the first lieutenant-colonel.

The regiment in whole or in part was in the engagements at Fort Niagara, Frenchman Creek, the capture of Fort George, at Beaver Dams, Chrystler's Fields, De Cole Mill, Chippewa and Cook's Mills.

The roster of this original 14th Infantry will be given in an addenda, but there was one officer who fought under its banner, who deserves more than passing notice. Among the young ensigns of the regiment was one John A. Dix. He fought gallantly through the second war with Great Britain and did not resign from the Army until 1828. While the Mexican War was being carried on, he was a United States Senator from the State of New York. An attempt was made to have the grade of lieutenant-general established so that President Polk could appoint a political favorite to the command of the Army over General Winfield Scott. It was by the exertions of General Dix, that this partisan scheme was frustrated and that the hero of Lundy's Lane and Chippewa received the command of the Army which invaded Mexico from Vera Cruz. Fifteen years later the ex-ensign of the 14th Infantry was a member of the reconstructed cabinet of James Buchanan as Secretary of the Treasury. Just before the secession of Louisiana, information came to the Capitol, that the fire-eaters of New Orleans were threatening to pull down the National flag from over the Custom House. An answer was flashed back which thrilled the country like a bugle call. "If any man attempts to haul down the American flag, shoot him on the spot," (signed) John A. Dix. The lessons learned by the young subaltern of 1812 were not forgotten by the grey haired statesman of 1861.*

The 14th Infantry was again organized in April, 1847, under an act of Congress, passed and approved the preceding February.

The colonel was Wm. Trousdale of Tennessee. The lieutenant-colonel, Paul O. Hebert of Louisiana, a graduate of the Military Academy and a lieutenant in the Corps of Engineers. The major of the regiment, was Charles Wickliff.

With three exceptions the officers of the regiment were appointed from Louisiana and Tennessee.

As the organization of the regiment was not completed until the 9th of April, it did not join General Scott's column in time to take part in the siege of Vera Cruz or the battle of Cerro Gordo, but joined the main army at Puebla early in June, 1847. It was assigned to Cadwallader's Brigade of Pillow's Division. Their brigade consisted of the Voltigeurs, the 11th and 14th Infantry.

They took a conspicuous part in the battle of Contreras on the 19th and 20th of August. On the 19th with their brigade they held the village of Contreras from daylight until dark under the fire of Valencia's entire division, the most thorough baptism of fire new troops ever received. That night they marched through a break in the Mexican line and up a ravine that led them directly in rear of the Mexican position. When the charge was made in the morning the battle lasted seventeen minutes and the pursuit four hours. A pleasant little episode for the 14th was the repulse of a charge of lancers. From Contreras, Pillow's division hastened over to support Worth in his attack on Churubusco. The 14th participated in no less than four attacks that day. It fought also at Molino del Rey, at Chapultepec, and the storm-

* It is interesting to note, that his father, Timothy Dix, was made the lieutenant-colonel of the 14th Infantry in 1813, and that his son, Chas. T. Dix, was commissioned as a lieutenant of the new 14th in the War of the Rebellion.

FOURTEENTH REGIMENT OF INFANTRY. 675

ing of the San Cosmo gate. The engineer officer who indicated to the 14th its line of attack at Contreras was Lieutenant Beauregard; a battery they supported for a time at Chapultepec was commanded by Lieut. Thomas J. Jackson; the engineer officer who led the way over the San Cosmo causeway was Capt. Robert E. Lee, and the officer who marched with them in command of a platoon of sappers and miners to the San Cosmo gate was Lt. Geo. B. McClellan.

"There's a divinity that shapes our ends,
Rough hew them how we will."

The colonel, lieutenant-colonel and five other officers of the Fourteenth were breveted for conspicuous gallantry in the battles in the valley of Mexico.

On the 29th of July, 1848, this splendid regiment was disbanded, and its battle-stained banners laid away in dust and darkness. After the call for 75,000 volunteers in 1861, the Chief Magistrate deemed it expedient also to increase the strength of the Regular Army. To meet the question of re-organization, a board was appointed by the President, consisting of the Hon. S. P. Chase, Secretary of the Treasury; Maj. Irvin McDowell, Assistant Adjutant-General; and Capt. William B. Franklin of the Engineers. The military members proposed a three-battalion organization of eight companies each for the infantry regiments. They recommended an addition of one regiment of artillery, one of cavalry and nine of infantry. This would have given 57 battalions for the last named branch of the Service.

Mr. Chase concurred, but Congress, in passing the act of July 29, only made the three-battalion scheme to apply to the nine new regiments. It must be understood that as to the general war policy of his administration. Mr. Lincoln of course consulted his Cabinet, but advised freely with General Scott, Adjutant-General Thomas, and as Mr. Welles has it in his memoirs, "a young man named Meigs."

The organization of the 14th Infantry followed promptly the President's proclamation. The headquarters of the regiment was fixed at Fort Trumbull, Conn., and the first order, temporarily assigning officers appointed to date May 14th to companies, was issued on the 8th of July, 1861. This order was signed by Lieut.-Col. John F. Reynolds, who organized the new regiment and was its first commander.

The colonel, Chas. P. Stone, had already been made a brigadier general of volunteers, and was serving at the time in General Patterson's army. He never joined the regiment until the fall of 1864, and then only for one day.

General Stone had served as a lieutenant of ordnance in the Mexican War. He resigned in 1856. In the trying period preceding the inauguration of Mr. Lincoln, he was very active and zealous in organizing an improved command for the defense of Washington. He was a refined, scholarly gentleman and an accomplished officer. But he was "too full of the milk of human kindness to catch the nearest way;" so it happened that he was probably more harshly dealt with than any officer who ever held a commission in our Army.

Lieutenant-Colonel Reynolds was a veteran who had been in the Service

since 1841. He had served in the Florida and Mexican wars, and was destined to a soldier's death, commanding an army corps on the field of Gettysburg. No better man could have been found to bind together the heterogeneous elements of which a new regiment was compounded.

He selected for his adjutant Lieut. Edwin F. Townsend (now colonel of the 12th Infantry) a West Point graduate who had resigned and gone into civil pursuits, but who had again accepted a lieutenant's commission when the War broke out; a position by no means commensurate with his merits, but which he accepted from purely patriotic impulses.

General George Sykes, the senior major, did not report, but Major G. R. Giddings and Major William Williams reported promptly and were assigned to the 2d and 3d battalions respectively.

As fast as the captains and lieutenants came they were assigned to recruiting stations, generally in the New England States and New York.

The first recruiting order was issued at Fort Trumbull, July 10, 1861.

The first company was organized and put into camp on the 17th of August. It was under the command of Captain Samuel Ross, a veteran, who had joined the Army as a private in 1837. A second company was soon organized and assigned to Captain Jonathan Hager. A battalion was organized, mustered and inspected on August 31st, and Lieut. W. R. Smedberg announced as adjutant.

So far the organization had run smoothly, but the regiment now met its first serious loss. Its lieutenant-colonel was made a brigadier-general of volunteers, and its adjutant was promoted to a captaincy in the 16th Infantry.

Major Giddings, who assumed command, was a son of the Hon. Joshua R. Giddings, the abolition leader of Ohio. Captains J. D. O'Connell and David B. McKibbin, officers of experience, reported in time to take up the good work. Of the civil appointees one, Copperger, had seen service abroad, having been an officer of Papal Chasseurs. The other officers had little or no antecedent military training, but they were, with few exceptions, men of such quick apprehension, zeal and untiring application, that they learned their duties within a short time.

Among the men who first enlisted there were a number of well-trained soldiers; some of them had served in the old regiments of our Army and others in some of the European armies. Many of these men won commissions, and they all did much by precept and example to encourage the raw recruits. Indeed their influence was invaluable, as they not only taught the new men how to take care of themselves, but to make light of hardships.

Some educated gentlemen enlisted for commissions and won them soon. The men who won advancement in this honorable way were Lieutenants Perry, Peck, Choisy, C. G. Smedberg, J. K. Clay, Vernou and Browning.

So rapidly was the regiment recruited that eight companies and the band were organized and sent by the middle of October to Perryville, Md., where they went into Camp Stone, so-called, after their first colonel.

The battalion first organized was designated the Second, as General Sykes, the senior major, had been assigned to the command of the 1st Bat-

talion, but had not reported. As Major Giddings, the proper commandant of the 2d Battalion, was kept back at Fort Trumbull in command of the regiment, the command of the battalion sent to Perryville devolved on the senior captain, J. D. O'Connell—universally known in the Army as "Paddy." He had served in the old 2d Infantry from 1852 to 1861.

The 14th Infantry owes a lasting debt of gratitude to this noble man. He did more than any other officer to instruct it and to instill into it principles of patriotism, self-sacrifice and devotion. Captain O'Connell was not "brilliant," he was better than that, for in the best sense of the word he was a good man. He was single-minded and artless, diligent, faithful and self-denying. With him the interests of the men came first, the officers second and *his own last*.

The health of the command was not good at Camp Stone. This was attributed to bad water and a lack of fresh vegetables.

Sergeants Henton, Bellows and Loosley were promoted to lieutenants. Their advancement was a stimulus to others. On Dec. 18th the headquarters of the regiment was established at Camp Stone, Major Giddings in command, bringing Lieutenant Schuyler and King as adjutant and quartermaster. One company of the 3d Battalion joined soon after. The rest of the winter was devoted to drills and instruction.

On March 7th, 1862, Camp Stone was abandoned and the regiment proceeded under orders, first to Washington and thence to Fairfax, Va., where they joined the Regular Brigade under General Sykes, in the Army of the Potomac, on March 13th. Two days before the Confederate army had fallen back to the south of the Rappahannock and on the day the 14th reported for duty in the field, the President authorized the Peninsula Campaign. Thus it happened that in a few days the Regulars marched back to Alexandria, Va., and made their preparations to embark on transports for Newport News. Major Giddings, with headquarters, went back to Fort Trumbull. On March 27th nine companies under the command of Captain O'Connell embarked on a steamer at Alexandria and on the 29th debarked at Hampton, Va. From thence they marched with the rest of the brigade and went into a camp near Yorktown, Va., April 4th.

The regiment then formed a part of what was called the "Infantry Reserve Brigade," which was made up of the 2d, 3d, 4th, 6th, and parts of the 10th, 17th, the 11th, 12th, 14th Infantry, and the 5th New York—Colonel Warren's regiment, whose warriors were known from their Zouave dress as the "Red-legged Devils." The history of the brigade for the next month was that they worked in the trenches at Yorktown.

The 14th had now fallen under their senior major, but in his capacity of brigade commander. It would have been hard to find a better officer in the Army than General Sykes; a Southerner by birth, he was so thoroughly and simply a soldier, that he knew little of politics and cared less. His indifference to all civil matters was a subject of surprise to the civilian appointees who served with him.

He was unsympathetic and methodical, a man of details, diligent and untiring, but never hurried, never flurried; one of the coolest men in dan-

ger or confusion that we had in the whole Army. He enforced discipline like a machine and had apparently no more sentiment than a gun-stock.

On the 30th of April, in compliance with an order from the War Department, Cos. "A," "B," "C," "D," "F" and "H," 2d Battalion, and Cos. "E" and "H" of the 3d Battalion, were transferred to and designated as the 1st Battalion; all retaining their letter designations except "G," of the 3d, which became "G" of the 1st; "C" of the 3d became "C" of the 2d, and was attached as a supernumerary company.

On May the 8th the Confederates evacuated Yorktown, and for the next six weeks the history of the regiment was as uneventful as if it had remained at Perryville. It took no part in the battle of Williamsburg, but marched slowly up the Peninsula with the Army of the Potomac.

About the 17th of May, when the command was in camp at Cumberland, the Reserve Brigade, with the addition of the 10th N. Y. Vols., was formed into a division under Sykes, which with a division of volunteer infantry under Morell, constituted the 5th Provisional Corps under Maj.-Gen. Fitz John Porter.

The 1st Brigade of the Regular Division was under Lieut.-Col. Robert C. Buchanan, 4th Infantry, with Capt. Robert N. Scott as A. A. General, and Lieutenants Van Rensselaer and Powell as aides-de-camp.

The brigade was made up of the 3d Infantry, Captain Wilkins, the 4th Infantry, Captain Collins, the 1st Battalion, 12th Infantry, Major H. B. Clitz, and the nine companies of the 14th Infantry, Captain O'Connell.

The 2d Brigade was under the command of Lieutenant-Colonel Chapman, and was made up of the 2d, 6th, 10th, 17th and 11th Infantry and Warren's Brigade of his own, the 5th New York, and Colonel Bentick's 10th New York.

Sykes' Division took no part in General Porter's fight at Hanover, against Branch, or in the battle of Fair Oaks, but remained quietly in camp, 26th May until the 26th of June. For two years the history of the regiment will correspond closely with that of the brigade.

No better account of the battle of Gaines' Mill can be given than is given in the Official Report No. 146, War of the Rebellion Records, S. 1. Vol. xi., p. 2, p. 369.

HEADQUARTERS 1ST BATT. 14TH INF.
CAMP NEAR JAMES RIVER, VA.,
July 4, 1862.

SIR:—In compliance with instructions, headquarters of the brigade, I have the honor to submit the following report:

June 27.—Ordered across the creek near Gaines' Mill, and engaged the enemy about seven o'clock, A. M., which continued till dark. The greater part of the day the battalion occupied the right of the 12th Infantry. I was directed to throw back the two right companies to protect the right flank.

With this formation I succeeded in driving the enemy clear from the field, following them up to the woods where they suffered severely.

I then retired to the crest of the hill, about 200 yards from the woods in front, and saw that the 3d Infantry was posted on the edge of the woods on my right flank, leaving some distance between its left and my right. Here a severe fire was poured in on my right flank from the woods, which caused me to change front and drive them from

that position. Again the enemy renewed their fire in my front, when I changed front and completely routed them, clearing them from the pine shrubbery in front of my position. I then returned to the crest of the hill, and finding the 12th and 3d Infantry had retired, that the enemy's infantry could not be seen, and that their artillery had a true range of the battalion with their shells, I retired also and took my position on the right of the 12th Infantry near the woods, just below the house near Edwards' battery.

From this point the battalion received a severe fire from the woods, which was vigorously returned by the battalion, slowly retiring in good order to the lane near the house referred to, where it took up and held a position until the troops were drawn from the field. During this engagement five officers,—Captain McIntosh, Lieutenants Sinclair, McElhone, Lyon and Hoover—were wounded, the last three badly. Eighteen enlisted men were killed, 113 wounded, and 12 missing. The list of killed is probably greater than here stated. The officers and men behaved well. At night crossed the Chickahominy and encamped on the ground that had been occupied by the general headquarters near Savage Station.

* * * * *

July 1.—Participated in the battle fought near that camp (Malvern Hill) having 1 man killed, 11 wounded and 1 missing. At night the 1st Brigade, which was in advance, formed the rear guard, and held the position while the troops were withdrawn, and covered the movement of the army to the rear.

July 3.—Moved to this camp.

At the battle of the 1st the battalion arrived just in time to engage a regiment of the enemy, which was completely routed. The officers and men behaved well. Captain McKibbin, the second in command, was everywhere his presence was required. The conduct on both the above occasions is much to be admired. The company officers in their places behaved in like manner. Lieutenant W—absented himself from the battalion on the evening of the 1st and did not join until near the present camp and could not satisfactorily account to me for his absence from the battalion.

I am sir, very respectfully, your obedient servant,

(Signed) J. D. O'CONNELL,
Captain 14th Infantry, Commanding Battalion.

Lieutenant POWELL,

Adjutant 4th Infantry, A. A. A. G., First Brigade Sykes' Division.

P. S.—At the battle of July 1, the battalion took 11 prisoners, who were disposed of as directed by the division commander.

Colonel Buchanan in his report of the seven days says: "The two old regiments, the 3d and 4th, maintained their previous reputation, and the new battalions, the 12th and 14th, earned one for themselves." He complimented by name Captains O'Connell and McKibbin, as did also General Sykes.

In his report of the battle of Malvern, Sykes speaks with especial commendation of three well directed volleys which the 14th Infantry poured into a Confederate brigade, charging near the close of the battle, from the extreme right. This brigade is believed to have been Wright's of Huger's Division, and the regiment which suffered most from the fire was the "Louisiana Tigers."

The amended returns as we now have them, show that the loss of the regiment for the seven days was, killed, wounded and missing 255, including Lieutenant Hoover, who died of wounds received at Gaines' Mill. This was the heaviest loss in the division.

The loss of the brigade was 567. But for this a bloody retribution was exacted. The brigades of G. B. Anderson and Garland are known to have been the opponents of Buchanan's Brigade at Gaines' Mill. Their official loss is reported for the first named, 863, for the second, 844. About half of this loss was sustained at Gaines' Mill, and the remainder at Malvern.

Wright's Brigade lost 666 men at Malvern, and the "Tigers" alone lost 167 men. The 12th and 14th had a little side issue the evening before Malvern, which is known officially as Turkey Bend, Company C, 2d Battalion, taking 12 prisoners. After Gaines' Mill, Major Clitz and Captain Stanhope were left on the field severely wounded. After our withdrawal they reported that they were visited by a number of old army officers who had gone South: Hill, Anderson, Whiting, Stewart, and Jackson himself. All spoke with admiration of the firmness of the Regulars, and all expressed sympathy and offered assistance, except Whiting, who was born in Maine.

At Harrison's Landing the 20th Battalion joined July 5th. The companies reporting were A, B, D, E, F, G and H, under Captains Copinger, Thatcher, Durkee, O'Beirne, Lawrence, Locke and Watson. Company C, under Lieutenant Broadhead, was already there.

The regiment left Harrison's Landing August 15th, and proceeded to Aquia Creek, marching thence with the 5th Corps to Warrenton, Va., where it joined the Army of Northern Va., under General Pope, the 27th of August. On the 30th of August, the two battalions of the 14th, in the 1st Brigade, 2d Division of the 5th Corps, took a conspicuous part in the battle of Manassas—"Second Bull Run." The reports are too full and the description of the battle too complicated to be quoted. General Sykes, speaking of the attack made about four o'clock, in what was called the turning movement from the right, says: "Butterfield's attack was gallantly made and gallantly maintained until his troops were torn to pieces. My first brigade, under Buchanan, moved to his aid, relieved him, and became furiously engaged."

The following is an extract from Colonel Buchanan's report:

"As soon as notified that I was unmasked by Butterfield, I advanced the two battalions of the 14th into and through the woods to his support, and held them there until after the brigade was entirely withdrawn, when my whole column was ordered to the rear. While in the woods we were under a most incessant fire of all arms, but my officers and men behaved admirably. Here it was that Captain O'Connell of the 14th Infantry was wounded in the knee while commanding the 1st Battalion, and Capt. D. B. McKibbin, 14th Infantry, in the ear, while commanding the 2d Battalion."

After the failure of this attack and the enemy had begun their counter-attack, the first brunt of which fell upon Warren's Brigade, the rest of the division was moved by the Henry House Hill, on which, a little more than a year before, had raged the fiercest fighting in the First Bull Run.

The following is an extract also from Colonel Buchanan's report:

"About 6 P. M. I was ordered to take the battalions of the 12th and 14th to the woods to our left and front to support Meade's Brigade, then severely pressed by the enemy; and almost immediately after placing these troops in position, I observed that the 3d and 4th had also been ordered up."

"I found the enemy in very strong force in the woods, and during the heat of a very severe engagement discovered that he was flanking me with large masses of troops. I immediately commenced to gain ground to my left so as to meet his movements, and held him in check for nearly an hour. But at length I found the contest too unequal; my command was being cut to pieces; the ammunition of the men nearly expended and the enemy's masses vastly outnumbering my force. I was forced to give the order to retire.

"This was done in most excellent order, the men marching steadily and slowly and I resumed my position on the plateau.

"Shortly after I was ordered to retire with my brigade to Centreville, which I did, and reached the point at 10 o'clock at night, having the entire brigade with me in good order and having left but few stragglers behind."

During this fight the rebels in the woods displayed the National colors. Captain O'Connell rode forward to ascertain whether they were in the hands of friends or foes, when he was fired on, again wounded, and his horse killed. The two lines not even forty yards apart fired into each other by volleys. This desperate fighting was maintained for an hour. The front attacks were constantly repulsed, but as the battle was hopelessly lost, the division was slowly withdrawn to Centreville.

The officers of the 14th present in the battle were as follows:

FIRST BATTALION.

Capt. J. D. O'Connell (wounded), Dr. Forwood, Captains Brown, Ilges, Watson, Smedberg, King and Burbank; Lieutenants Broadhead, Walker, Sinclair, Collins and Henton, Loosley (Adj't.), and Krause (Q. M.).

SECOND BATTALION.

Captain D. B. McKibbin, Comdg.

Captains Coppering (wounded), Thatcher, Locke (wounded), Durkee, Douglass, Lawrence, Overton; Lieutenants Wharton (wounded), Porter, Vanderslice, (Adj't.), and Downey, (Q. M.)

The loss of the 1st Battalion in killed, wounded and missing out of 482 present, was 129, and of the 2d Battalion 48 out of 313 for duty. One officer of the 1st and four of the 2d were wounded. The officers of both battalions were commended in the highest terms for their coolness and bravery.

O'Connell and McKibbin were praised in all reports for their efficiency, and Major C. S. Lovell, who was three years after to become the colonel of the 14th Infantry, was particularly mentioned in General Sykes' report for his conduct.

The Confederate brigades of Toombs, G. T. Anderson and Cadmus Wilcox, are now known to have been engaged against Buchanan's and Lovell's; their loss was heavy.

From Centreville the Regular Division marched back to Hall's Hill near the Chain Bridge, over the Potomac.

There the 2d Battalion of the 12th Infantry, with two companies of the

8th, under the command of Captain Anderson, which had been campaigning with Banks' Corps of Pope's army reported and were assigned to the 1st Brigade.

From Washington the Division marched slowly to Fredericksburg, Md., and from thence to South Mountain, when it was held in reserve and was for a time under shell fire.

Early on the morning of the 15th, it marched over the crest of the hill covered with the killed and wounded of the battle of the preceding day, and thence to the Stone Bridge over the Antietam Creek near Sharpsburg.

Richardson's Division, which had preceded Sykes', formed to the right of the road and the Regular Division, after turning the head of the column to the left, came on right into line under a lively artillery fire, thus forming line of battle with Buchanan's right resting on the Sharpsburg road.

In the battle of Antietam the battalions in the 1st Brigade were commanded by captains, as follows: The 3d, Wilkins; the 4th, Dryer; the 1st battalion of the 12th, Blunt; the battalions of the 8th and 12th, Anderson; the 1st of the 14th, Harvey Brown; and the 2d by D. B. McKibbin.

In the great battle of September 17th, the Regular Division was held in reserve and in support of the reserve artillery until about two o'clock in the afternoon, when Capt. Hiram Dryer was ordered to cross the Antietam creek with the 2d and 10th, the 4th, 12th and 14th Infantry.

These regiments supported Tidball's batteries, and about sundown advanced and easily drove back the enemy into the village of Sharpsburg. Captain Dryer did not feel authorized to go further without orders, and applied for permission to press his attack. It appears from official reports that General Pleasanton also advised an advance. General Sykes told the writer after the war that it was on this occasion that General Fitz John Porter reminded General McClellan that his corps was the last reserve of the last Army of the Republic. It is needless of course to speculate on what might have been, but this can be said, that the Regular Division was that day in its best condition.

Captain Dryer rode into the rebel lines and saw that there were but two regiments and a battery left in the centre. That night there was gnashing of teeth in the Regular camp. A few days after the battle, a division forded the Potomac River and made a demonstration, which led to a partial engagement, which was called the action of Leetown. The 14th was in the fight and had a number of men wounded. For nearly six weeks after the battle our division remained in camp refitting, drilling, and doing picket duty. It marched with McClellan's forward movement, and at Snicker's Gap, under Captain O'Connell, who rejoined a few days before, had a very sad experience. A reconnaissance was ordered from the Gap to a ford on the Shenandoah by a force made up of a troop of Massachusetts cavalry, the 6th, 7th and both battalions of the 14th Infantry. The enemy was met in small force and easily driven across the river. But on the opposite bank there was a strong force of the three arms. It was not the intention to seriously engage this force, but only to develop its strength. Unfortunately Captain O'Connell received an order to advance even after a heavy fire of

artillery had been opened. He knew, as did all his regiment, that somebody had blundered, but on they went like the Light Brigade.

Both battalions advanced in line of battle to the banks of the river under a terrific fire, and when ordered to retire, they marched back as coolly as from a parade. Five enlisted men were killed, and Lieutenant Perry and twenty-six were wounded. Dr. Forwood, on this as on many other occasions, showed the utmost zeal, skill and devotion. Poor Paddy O'Connell said after the fight was over, the tears running down his seared and weather beaten face : " I would take the 14th to the gates of hell, but I would like to have a chance to whip the devil when I got there." From Snicker's Gap we marched to Warrenton Junction, where McClellan was relieved. The regiment marched with its proper command to Falmouth, opposite Fredericksburg. In the battle of December 13th it passed through a very trying ordeal. With the rest of the Regular Division it went to the front in the dusk of the evening, between Hanover Street and the plank road. About midnight we occupied the front line some 150 yards from the crest of the hill held by the Confederate line.

This position was kept for twenty-four hours under a galling fire which could not be effectively returned. On the morning of the 16th, Buchanan's brigade covered the retreat of the Army over the river, Captain O'Connell commanding the 1st Battalion ; Captain Overton was the ranking officer of the 2d Battalion but Captain Thatcher was placed in command. The officers present with the regiment on this occasion were Captain O'Connell, commanding regiment, Captain Keyes acting field officer. *1st Battalion* : Co. A, Lieut. Henton ; Co. B, Lieut. Walker ; Co. C, Lieuts. Collins and Doebler ; Co. D, Lieut. Bellows ; Co. E, Capt. Burbank ; Co. F, Capt. Smedberg and Lieut. Sinclair ; Co. G, Lieut. Broadhead ; Co. H, Lieut. Moroney ; adjutant, Lieut. Loosley ; asst. surgeon Dr. Bacon. *2d Battalion* : Capt. Overton, A. F. O. ; Capt. Thatcher, A. F. O., commanding battalion ; Cos. A and H, Lieut. Bainbridge ; Cos. B and C, Capt. Watson ; Co. F, Lieut. Porter ; Co. E, Lieut. McKibbin ; Co. G, Capt. Locke ; Co. D, Lieut. Douglas ; adjutant, Lieut. Vanderslice ; asst. surgeon, Dr. Jaquett.

After Fredericksburg, the regiment remained in camp about one and a half miles back of Falmouth until the following May, with the exception of the episode known as the Mud March—a futile attempt to cross the Rappahannock, January 12th, 1863.

Our winter camp at Falmouth was a very memorable one to all of the Regulars, for it was there we became best acquainted with each other. But the members of the 1st Brigade became particularly well acquainted with "Old Buck," as Colonel Buchanan was playfully called. It was then and there that he first had a good chance at us. He soon took us in hand and we began to find out what discipline was, what army papers were, and, as he cheerfully assured us, that the regulations were not made for brigadier generals. But alas for army jesting, the veteran discovered before the end of his career, that even a hero of three wars could be forced to retire under the regulations sorely against his will.

During the winter we had no end of fatigue and picket duty, drills and recitation. By way of diversion, there was poker-play at night and horse

racing, steeple chasing, and shooting matches by day. We had also singing clubs, and grotesque societies. These were the last days of commissary whiskey, and the good fellows of Sykes' division are not likely to forget one celebration in Snip Snyder's commissary tent, which brought the division commander around about 2 o'clock one night with the inquiry: "Gentlemen, what is the occasion of this sudden outburst of inebriety?"

But as Fighting Joe Hooker had been put in command, we knew that the "general" would be sounded in our camp early in the spring. It came the last week in April.

Before this, many changes had been made. General Meade had been placed in command of the 5th Corps, General Warren had been placed on the headquarters staff, Colonel Buchanan had been relieved and General Ayres had assumed command of our brigade.

Captain O'Connell had gone on recruiting service and Captain Hager had assumed command of the regiment in the field. On the first of March, 1863, there was a consolidation of companies in the Regular Division, and two battalions of the 14th were reduced to one battalion of eight companies, A, B, D, E, F and G of the 1st, and F and G of the 2d.

The officers were Captains Hager, Brown, Thatcher, Norton, Ilges, Coppinger, Lawrence, Clay, McCall and Lieuts. Downey, McKibbin, Weir, Tom Collins, Sinclair, Miller, Foote, Porter, Vernou, McClintock and Douglas; Captain Joe Locke was on the brigade staff. Camp was broken for the Chancellorsville campaign April 27th; we crossed Ely's Ford of the Rapidan on the night of the 29th, the men, stripping to the buff, wading through with shouts and laughter. On the morning of the 1st of May the Regular Division marched down the Fredericksburg pike, to meet McLaws' division coming up. The second brigade, then much reduced in numbers, was in advance as skirmishers. The 12th and 14th marched after them in line of battle to the right and left of the road. We soon met the enemy and drove them before us for more than a mile with a perfect rush. The men were full of fight and moved with alacrity. In the first rush a whole company was captured. We were halted in line near the cross-roads, leading to Banks' Ford. But, alas, we were ordered back. Then there was heard cursing and grumbling from the Regulars, not at being ordered into danger, but at being ordered out. All knew too well that again somebody had blundered. In the dusk of the evening we were placed in a new position facing the woods beyond the plank road. Here a brigade of the enemy ran on us, I think by mere chance. The 5th New York (the Red Legs), had a sharp fight, but the rest of us only fired a few volleys which sent our opponents to the right-about. While this was going on I heard a chaplain shouting out behind us: "Give 'em Hell, boys; give 'em Hell, and the Lord have mercy on their souls."

But, alas, how terribly is the comedy and tragedy of war intermingled.

With almost the last volley of the fight gallant young Temple, the darling of the 17th, was killed. Then Jerry McKibbin, a brave and generous man, dashed into the line and carried Temple's body out on his horse. It was buried that night at the foot of a tall, solitary pine, while Weed's Battery,

that stood near, sent shell after shell into the enemy's lines. The whole scene reminded us all of the funeral of Sir John Moore.

When the 11th Corps broke, two days after, we were hurried over at the double to take the right of the line, but we had a mere skirmish. The regiment lost one officer (Overton) wounded, five enlisted men killed and six wounded. Major Giddings arrived just after the battle and assumed command. After the Army of the Potomac returned to the north of the Rappahannock, foiled but not defeated, the Regular Division resumed its old camps. We had sustained but little loss from the enemy, but our ranks were severely depleted from other causes. The loss from desertion was very great and most discouraging, and we were getting but few recruits to make up for our losses. The 14th had lost as many as seventy-two in a single month. The total in the year was four hundred and thirty-one.

Immense local bounties were being paid all over the country for men to fill the volunteer regiments, and the Government bounty of \$200, which was all that could be given for enlistment in the Regular Army, was no inducement to men who could get from \$1000 to \$2000. Hundreds of men left us to go and enlist under assumed names elsewhere. Then, of course, many were discharged for disability. At the same time many officers were sent away from us on detached service. Here a short description of the general method of campaigning followed in the later operations of the War may not be out of place.

Each regiment or full battalion had two wagons for the companies and one for headquarters and hospital, unless the command was small, when the third wagon was dispensed with. Officers' messes generally had a sumpter horse or mule of their own that followed the column. In the last year of the War, when mules got scarce and darkies were plenty, these sable strikers often carried the stewpans and provender. In the immediate presence of the enemy shelter tents were used by all. Camps were generally made by regiments in columns of divisions, winter cantonments were larger, cribs were put under the tents, or small log houses made or "dug-outs" were substituted if the camp was on a hill side. Some of the sutlers were very enterprising and had reasonably good stock of staple articles. If all else failed, they generally had whiskey and gin cocktails.

The camp ration was generally coffee and hard tack, beef or bacon, beans and rice.

Unless the march was to be a secret one the "general" was sounded at corps headquarters and repeated in rapid succession at division, brigade and regimental headquarters, and was succeeded for a few minutes by a pandemonium of shouts, yells, cat calls, barkings and the like. This would be followed by a period of well systematized activity, which caused the most elaborate camps to disappear like a mist.

Tours of picket duty lasted three days when in permanent camp. As a rule Mahan's system of outpost duty was pretty closely followed.

The march to Gettysburg began June 13th, the regiment marching with the Division to Manassas Junction and Leesburg, Va.; crossing the Potomac near Edwards' Ferry, it marched thence through Frederick, Md., to Han-

racing, steeple chasing, and shooting matches by day. We had also singing clubs, and grotesque societies. These were the last days of commissary whiskey, and the good fellows of Sykes' division are not likely to forget one celebration in Snip Snyder's commissary tent, which brought the division commander around about 2 o'clock one night with the inquiry: "Gentlemen, what is the occasion of this sudden outburst of inebriety?"

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The officers were Captains Hager, Brown, Thatcher, Norton, Ilges, Coppinger, Lawrence, Clay, McCall and Lieuts. Downey, McKibbin, Weir, Tom Collins, Sinclair, Miller, Foote, Porter, Vernou, McClintock and Douglas; Captain Joe Locke was on the brigade staff. Camp was broken for the Chancellorsville campaign April 27th; we crossed Ely's Ford of the Rapidan on the night of the 29th, the men, stripping to the buff, wading through with shouts and laughter. On the morning of the 1st of May the Regular Division marched down the Fredericksburg pike, to meet McLaws' division coming up. The second brigade, then much reduced in numbers, was in advance as skirmishers. The 12th and 14th marched after them in line of battle to the right and left of the road. We soon met the enemy and drove them before us for more than a mile with a perfect rush. The men were full of fight and moved with alacrity. In the first rush a whole company was captured. We were halted in line near the cross-roads, leading to Banks' Ford. But, alas, we were ordered back. Then there was heard cursing and grumbling from the Regulars, not at being ordered into danger, but at being ordered out. All knew too well that again somebody had blundered. In the dusk of the evening we were placed in a new position facing the woods beyond the plank road. Here a brigade of the enemy ran on us, I think by mere chance. The 5th New York (the Red Legs), had a sharp fight, but the rest of us only fired a few volleys which sent our opponents to the right-about. While this was going on I heard a chaplain shouting out behind us: "Give 'em Hell, boys; give 'em Hell, and the Lord have mercy on their souls."

But, alas, how terribly is the comedy and tragedy of war intermingled.

With almost the last volley of the fight gallant young Temple, the darling of the 17th, was killed. Then Jerry McKibbin, a brave and generous man, dashed into the line and carried Temple's body out on his horse. It was buried that night at the foot of a tall, solitary pine, while Weed's Battery,

that stood near, sent shell after shell into the enemy's lines. The whole scene reminded us all of the funeral of Sir John Moore.

When the 11th Corps broke, two days after, we were hurried over at the double to take the right of the line, but we had a mere skirmish. The regiment lost one officer (Overton) wounded, five enlisted men killed and six wounded. Major Giddings arrived just after the battle and assumed command. After the Army of the Potomac returned to the north of the Rappahannock, foiled but not defeated, the Regular Division resumed its old camps. We had sustained but little loss from the enemy, but our ranks were severely depleted from other causes. The loss from desertion was very great and most discouraging, and we were getting but few recruits to make up for our losses. The 14th had lost as many as seventy-two in a single month. The total in the year was four hundred and thirty-one.

Immense local bounties were being paid all over the country for men to fill the volunteer regiments, and the Government bounty of \$200, which was all that could be given for enlistment in the Regular Army, was no inducement to men who could get from \$1000 to \$2000. Hundreds of men left us to go and enlist under assumed names elsewhere. Then, of course, many were discharged for disability. At the same time many officers were sent away from us on detached service. Here a short description of the general method of campaigning followed in the later operations of the War may not be out of place.

Each regiment or full battalion had two wagons for the companies and one for headquarters and hospital, unless the command was small, when the third wagon was dispensed with. Officers' messes generally had a sumpter horse or mule of their own that followed the column. In the last year of the War, when mules got scarce and darkies were plenty, these sable strikers often carried the stewpans and provender. In the immediate presence of the enemy shelter tents were used by all. Camps were generally made by regiments in columns of divisions, winter cantonments were larger, cribs were put under the tents, or small log houses made or "dug-outs" were substituted if the camp was on a hill side. Some of the sutlers were very enterprising and had reasonably good stock of staple articles. If all else failed, they generally had whiskey and gin cocktails.

The camp ration was generally coffee and hard tack, beef or bacon, beans and rice.

Unless the march was to be a secret one the "general" was sounded at corps headquarters and repeated in rapid succession at division, brigade and regimental headquarters, and was succeeded for a few minutes by a pandemonium of shouts, yells, cat calls, barkings and the like. This would be followed by a period of well systematized activity, which caused the most elaborate camps to disappear like a mist.

Tours of picket duty lasted three days when in permanent camp. As a rule Mahan's system of outpost duty was pretty closely followed.

The march to Gettysburg began June 13th, the regiment marching with the Division to Manassas Junction and Leesburg, Va.; crossing the Potomac near Edwards' Ferry, it marched thence through Frederick, Md., to Han-

over, Pa., arriving there on July 1st, to learn that the fighting had begun at Gettysburg.

A night march was made and the command bivouacked within ten miles of the field of battle.

About noon of the second day's battle, the 5th Corps reached the field. It was held in reserve until the disaster to the 3d Corps and the attack on the Round Top. Doubleday gives this account of the fight:

"Then Ayres, who had been at the turning point of so many battles, went in with his fine division of Regulars, commanded by Day and Burbank, officers of courage and long experience in warfare. He struck the enemy in flank who were pursuing Caldwell, and who would have renewed the attack on Little Round Top, doubled them up, and drove them back to the position Caldwell had left. But his line, from the nature of things, was untenable, for a rebel brigade with ample supports had formed on his right rear, so that nothing remained but to face about and fight his way home again. This was accomplished with the tremendous loss of fifty per cent. of his command in killed and wounded."

Major Giddings, in command of the 14th Infantry, reported a loss of 141 officers and men. The amended report of casualties in the War Records gives the loss as 18 men killed, 2 officers wounded (Captain Locke and Lieutenant Douglas), and 108 men wounded and 4 missing; a total of 132. There were present in action 490 men.

A great loss to the regiment was their Lieut-Colonel, Gen. John F. Reynolds, killed in action July 1st, commanding his corps.

After Gettysburg the regiment marched in the 5th Corps to Williamsport, where Lee escaped across the Potomac; then to Berlin, where the Potomac was crossed, and so on to the Rappahannock.

On August 13, the brigade was sent to New York City to maintain order and prevent a recurrence of the draft riots. All actual rioting and resistance to the civil authorities had ceased before its arrival. After remaining a month in camp at Madison Square, the 14th went to the front, going into camp near Culpepper on September 24.

The regiment took part in the so-called Mine Run campaign; during the winter of 1863-64, with the other regiments of the Regular Brigade, it was engaged in guarding the line of the Orange and Alexandria R. R. In this duty it had many conflicts with rebel raiders and bushwhackers.

Any of the latter class caught in an attempt to burn bridges or to destroy the railway, were, under existing orders, hung at sight.

Preceding the campaign of 1864, a number of conscripts were received and distributed. Ours were drafted for us in the District of Columbia. Towards spring a number of convalescents returned from hospitals, and by the end of April, the 14th had one battalion of about 550 men present for duty.

In Grant's Wilderness campaign, the old Regular Division was melted down into one brigade and so weak had the regiments become that three volunteer regiments were added. These were the 140th and 146th New York, and 155th Pennsylvania. The Regular Army was represented by battalions of the 2d, 11th, 12th and 14th Infantry. The battalion of the 14th

under Captain E. McK. Hudson, was made up of A, C, D, G and H of the 1st and Cos. A, B and C, 2d Battalion. Captain Hudson, a graduate of the Military Academy, had served two years in the 3d Artillery before the War. In his old regiment he was called cool and handsome. He proved a dashing and brave commander for the regiment, and did much during the winter to bring it up to a high state of efficiency.

When camp was broken on the 3d of May the following officers were present: Hudson, Keyes, Miller, Ilges, Burbank, Brady, C. McKibbin, Perry, Sinclair, Tom Collins, Broadhead, John Clay, Krause and Drake DeKay; Coppinger, Smedberg and Choisy were with the division on staff duty. On the morning of May 5th there were 516 enlisted men present to fight.

At an early hour Griffin's Division started from the Lacy House up the Orange plank road with Ayres' Brigade in advance. We had not far to go before we met Jones' Brigade of Johnson's Division of Ewell's Corps. At the point of contact, the 14th Infantry was drawn up across the road in line of battle. The 12th Infantry was in line on the right in heavy timber, and the volunteer regiments forming a second line. The 6th Corps should have been on our right, but was not. The regiment had a cleared field in its front, and the Confederate line was two hundred yards away on the far side of the field. A section of artillery was in the road. Without waiting a moment Hudson ordered and led a charge at the double. The regiments to the right and left could not keep up on account of the tangle of brush they were in. The 12th on the right was soon attacked in front, flank and rear and had a hand to hand fight with Jones' Virginians. The 14th broke the line in their front without firing a shot, but were compelled to retire slowly by Stewart's North Carolina men, who came to reinforce Jones. We all had to fall back until we found a cross road on which we could reform. Then the fight was kept up until night. There was not a more brilliant charge than that made by the 14th, but it paid dearly for the glory of driving the Stonewall division; Hudson, Smedberg and Broadhead were wounded, and Captain Burbank and Lieutenant Tom Collins were killed. Lieutenant Collins' body is believed to have been burnt up in the burning woods; it was never found.

The loss during the month was 240 enlisted men, killed, wounded and missing. On the 6th, the fight was in burning woods and suffocating smoke. On the 8th, after the rest of the 5th Corps moved to Spottsylvania, the 12th and 14th Infantry remained behind with Bartlett's Brigade of our division to hold the right of the line. Patrick's provost guard brought up a large detachment of coffee coolers, who were put in our ranks. After this we had a little private fight of our own with one of Ewell's divisions.

At the battle of Spottsylvania, Lieut. John K. Clay was killed, Captain Keyes mortally, and Lieutenant Sinclair severely wounded; twelve enlisted men were killed and eighty-three wounded in the battle.

The fate of Captain Keyes was inexpressibly sad. He received a terrible gunshot wound just above the heart.

He was taken to a field hospital and laid on a bed of leaves with an officer of the 12th Infantry who had been wounded about the same time. There

was serious apprehension that the hospital and its inmates might fall into the hands of the enemy. So the 12th Infantry officer made a masonic sign to a sanitary commission official, and appealed to him to get him back to Fredericksburg. Keyes, utterly helpless, whispered: "Vouch for me as a Templar." The good Samaritan came and said, "My poor brother, you cannot be moved." Then Keyes whispered, "Tell him I have just been married. I know I cannot live, but I must see her again before I die." The Templar turned away weeping, but soon an ambulance was taking the two officers to the rear. Captain Keyes did see his young bride again—his loving young wife so soon to be a widow.

On May 18th, Capt. D. B. McKibbin reported and assumed command.

The regiment did some good service at the battle of North Anna. The brigade crossed at the Jericho ford and got in some telling work on Cadmus Wilcox's Division, making a return call for their Henry House visit at Manassas.

In the fight at Bethesda Church, the regiment lost six or seven men killed, and Captain McKibbin was taken prisoner, but the regiment gave as good as it got.

On June 2d an attempt was made to withdraw the 9th Corps from the right of line and to march it to Cold Harbor, but the enemy at once rushed over our intrenchments and got in rear of Ayres' Brigade, which, however, changed front and drove them back, but in making this change of front, a few were taken prisoners. No precaution seemed to have been taken to protect his flank, nor did the general staff of the Army see that movements were so co-ordinated as to guard against such surprises. We lost thousands of prisoners and many valuable lives from this method of issuing orders and then trusting to luck that they would be properly and successfully carried out.

Captain Thatcher took command and under him the regiment marched to Petersburg, and was next seriously engaged in the attack on the enemy's intrenchments, on June 18th and 19th, in which we lost one officer wounded and 24 men.*

At the battle of Weldon R. R., August 18th to 19th, Captain Ingraham was in command until on account of sickness he relinquished command to Lieutenant Foote.

On the first day, the brigade under Hayes repulsed a fierce attack of Mahone's Confederate Division.

The loss of the regiment was severe, particularly in officers. Captain O'Beirne and Lieutenant Perry were wounded on staff duty, and Lieutenants Foote and Weir with the regiment, and Lieutenant Brady was missing. That night there was but one officer for duty; four officers of other regiments were attached (Lieutenants White, Jackson, Smith and Driscoll).

The next day the Confederates worked their way through the thick woods and got in rear of the brigade, and the whole line charged to the rear losing many prisoners, but capturing some. The hand to hand fight-

* The regiment advanced as skirmishers on the brigade front. Fort Sedgwick, better known as Fort Hell, was subsequently built on the ground where our skirmishers made their fox pits in front of the Confederate Fort Damnation.

ing in the woods was of the most desperate character. Captain Newburg of the 12th was killed after he was wounded and a prisoner in the hands of the enemy. Sergeant La Belle, one of the color sergeants of the 14th Infantry, saved his color, although he was severely wounded. Sergeant Ovila Cayer of Company A, in saving one of the colors showed such conspicuous valor that he received a medal of honor.

On the 19th Lieut. Chambers McKibbin was wounded and the regiment had no officer of its own for duty. On the 21st the lines were fully re-established and thereafter held. The loss of the regiment was 111 killed, wounded and missing out of 295 present for duty.

The next battle in which the regiment was engaged was on Sept. 30th, 1864, at Poplar Grove Church or Chappel's House, which was fought over the ground on which the National Cemetery near Petersburg is located. The regiment was commanded by Lieutenant Sinclair. The 12th Infantry was also commanded by a Lieutenant Winston, who was killed there. This last fight was a victory in which our loss was small, only two killed, and that of the enemy severe. Private Robert Wright of the regiment received a medal of honor for gallantry in the battle. A number of officers soon after reported: Captain McClintock and Lieutenants Krause, Downey, Bellows, Loosley and Browning.

The last battle of the Rebellion in which the regiment took part was the action at Hatcher's Run, to the west of the Petersburg lines, Oct. 27, 1864. For some unaccountable reason the War Department has refused to give the Regular regiments credit for this engagement. Yet the Regular Brigade was there, held in reserve on the bank of the creek within two hundred yards of the firing line, and under fire at Armstrong's Mill Crossing.* The loss of Ayres' Division was 229 men.

Gen. Fred. Winthrop, one of the bravest and most brilliant captains of the 12th Infantry, who had been made colonel of the 5th New York and then a brigadier-general of volunteers, had command of the Brigade. The regiment remained in the field until the first of November, when it was ordered North. First it was sent to Buffalo, N. Y., where it remained until after the presidential election. For a few days the headquarters and the first battalion were located at Fort Wadsworth, from thence they were transferred to Elmira, N. Y., where the warriors made the acquaintance of their new major, Gurden Chapin, who began at once to tighten the reins of discipline.

The headquarters of the regiment were transferred back to Fort Trumbull on the 11th of Jan., 1865, but the first battalion remained at Camp Chemung, near Elmira, under Capt. D. B. McKibbin, until it was transferred to Hart's Island, Feb. 20th. This battalion was placed under the command of Major E. McK. Hudson, ordered to the field in March arrived at City Point April 4th, and was assigned to duty as one of the Provost Guard of the Army of the Potomac. On the 9th it appeared that they proceeded out to Burkesville Junction; from thence joined the headquarters of the Army of the Potomac. They marched with that army to Richmond, Va., and at a grand review of the Army as it marched through the capital of the fallen

* Humphreys "Va. Campaign," p. 308.

Confederacy, the 14th Infantry was given the right of the line by the express order of Major-General Meade, who said to Major Hudson, then commanding it: "The 14th Infantry has always been in front in battle and deserves the honor."

After that the regiment remained in Richmond on provost duty.

The officers of the regiment in the field in April, were Captains Hudson, O'Connell, Brown, Krause, McClintock, Overton and Clay and Lieutenants Browning, Vernou, Hollins, Porter, Lord, Mills, Choisy and Henton.

The review in Richmond, before General Halleck, marked the termination of the war service of the regiment in the Rebellion. Ten officers, and 158 enlisted men were killed in battle and 206 died of disease or from accidents incident to the Service, making a total of 374 in the War; a heavier loss than was sustained by any regiment in the Service of similar enlisted strength. Compared with all the infantry regiments mustered into the Government service it stands number 47 in aggregate loss; in this number six colored regiments are included, which sustained but a small loss in battle, but a frightful loss by disease. The loss of the 14th from this cause was very small.

There is no mathematical measure of merit. In civilized warfare you cannot kill without taking your chances of being killed, otherwise, war would be butchery not bravery. It is some consolation, however, to know that you have inflicted as great or a greater loss than you have sustained. But in fact both of these tests are fallacious. The men who maintain their discipline when others are shaken, who show fortitude in misfortune when others are discouraged, and bravery and enthusiasm in danger when others are appalled, are the men who deserve honor and renown.

Before passing to the frontier history of the regiment, it seems proper to refer briefly to the records of a few officers who although they belonged to the regiment did not actually serve with it.

A few days after the battle of the Weldon Railroad, General Stone came to regimental headquarters in the field. General Hays had been taken prisoner and the brigade was under the command of a volunteer colonel. General Stone reported as a colonel, having resigned his volunteer commission, but his rank would have given him the command of the brigade. As soon as this was ascertained he was ordered back to Army headquarters on some nominal duty.

Few men were more likeable than our first colonel, and few men had warmer friends. Yet from the first he was doomed to misfortune. After the unfortunate battle of Ball's Bluff, the friends of Colonel and Senator Baker blamed General Stone for mismanagement and to this the more serious charge of disloyalty was added and pressed by Senator Sumner and Governor Andrew of Massachusetts. This allegation seems to have no other foundation than an uncertain story, that General Stone while commanding the line of the Potomac above Poolesville, Maryland, let some negro servants of a rebel family in Leesburg, pass in and out of the lines by his authority. When this statement was referred to him, he indignantly refused to make an explanation to a charge that was really anonymous although urged by a senator and a governor. He was not sustained by General Mc-

Clellan, was put in arrest and sent to Fort Lafayette and afterwards to Fort Hamilton. As is known to all he never could get a trial, or an investigation. With singular inconsistency General McClellan recommended him for a corps commander. Subsequently when he was made chief of staff in the Department of the Gulf, General Banks made himself responsible for his loyalty.

After the Red River expedition General Stone was again made a scapegoat. He was succeeded as colonel by Gen. Gabriel R. Paul, who never reported, as he had lost his sight by a terrible wound received at Gettysburg.

General Sykes, the senior major of the regiment, never reported as such, but commanded it as division and corps commander in many battles. He was a model infantry officer.

Colonel John H. King, who succeeded General Reynolds as lieutenant-colonel, never reported. Major Levi Bootes never served with the 14th Infantry in the field, but he had served up to the date of his promotion as senior captain, commanding the 6th Infantry.

FRONTIER SERVICE.

In some way it became known before the order was issued that the 14th Infantry would be designated for a tour of duty on the Pacific Coast.

After the disbanding of the volunteer forces many wild characters found their way into the ranks of all the Regular regiments. Some of these men had done good service in the field, but they adopted a theory that as the War was over, discipline would be relaxed and that they should be permitted to have what they were pleased to call "a high old time." Nor was this pleasing theory confined to the ranks; a number of officers came to grief from practices under an epicurean philosophy which the War Department deemed "more honored in the breach than in observance." Thus it happened that the 14th got more than its share of Bacchanalian warriors.

In the last week of July the 2d Battalion left Richmond for New York City, followed in a few days by the 1st. Both assembled at Hart's Island, where they made their preparations for a trip to California via Panama. From the 2d Battalion alone, 221 men deserted in two weeks. They were all reported as bounty jumpers, assigned just before the close of the War.

It sailed from New York City on August 15, 1865, under Major Louis H. Marshall. This officer only reported for duty a few days before, having been on staff duty as colonel, A. D. C., up to the 28th of the preceding July. In passing over the Isthmus, the new men gave proof of their quality, for they proposed to take Aspinwall and Panama, and it was only by the courageous and forcible efforts of the officers, non-com. officers and old soldiers that the unruly element was subdued and the battalion safely embarked on the Pacific side.

Col. Chas. S. Lovell, who had been promoted to the colonelcy of the regiment upon the retirement of General Paul on February 16, 1865, reported for duty at Hart's Island, N. Y. H., August 28, 1865. He was the first full colonel to assume command of the regiment since its reorganization. The organization of the Third Battalion was begun and vigorously

pressed. At the same time the First Battalion was filled up, and on October 16th the field, staff and band of the regiment and four companies of the 1st Battalion, E, F, G and H, under Colonel Lovell, left New York and landed in San Francisco, November 12th, taking station temporarily at the Presidio. Cos. A, B, C and D followed two weeks later.

The Third Battalion, under Major Chapin, followed in November, arriving at San Francisco early in December. Here there was an outburst of turbulent hilarity which manifested itself chiefly in cutting off the pigtails of the Pagans. The battalion was hurried away to Arizona, where the exuberance of the young warriors could find less objectionable play in cutting off the scalp-locks of Apaches. The headquarters of the battalion under Major Chapin was fixed at Goodwin, with companies detached to Crittenden, Lowell, Grant and Bowie.

In October of 1865, the Second Battalion, under Major Marshall, had been sent to the Department of the Columbia, the officers for duty being Captains Ross, Coppinger, O'Beirne and Walker, and Lieutenants Henton, McKibbin, Wharton, Porter, Perry, Collins, Tobey and Kistler. Colonel Lovell soon followed with his regimental staff, Downey and Bainbridge, establishing headquarters at Fort Vancouver, December 8th.

In January of 1866, the 1st Battalion, under Major Hudson, was ordered to Drum Barracks and from thence to Fort Yuma, California, at which post the headquarters of the battalion was established February 6th, Co.'s A, B, C, G and H constituting the infantry garrison, Co.'s E and F having been left at Drum Barracks, and Co. D sent to Date Creek. On the 17th Captain O'Connell succeeded to the command. Subsequently Co. H was sent to Date Creek, and B and D to McDowell. In October the headquarters of the battalion were at Fort Whipple with Captain Krause in command.

The headquarters of the regiment remained at Vancouver Barracks until June, 1866, when it was ordered to San Francisco and thence to Arizona, where it was established September 6, 1866. The band was left at Fort Yuma.

In January, 1867, the headquarters of the regiment was transferred to Camp Lowell, Tucson, Arizona, where January 23, 1867, the provision of the act of Congress of July 28, 1866, altering the battalion organization into a regimental one was carried out and the 1st Battalion of the regiment with two companies subsequently added, became the 14th Infantry.

The 2d Battalion, which had remained in Oregon and Washington, became the 23d Infantry, and the 3d Battalion, which was serving in Arizona, became the 32d Infantry. On the 16th of April the headquarters of the regiment were established at Fort Yuma, in which military Tophet it remained until May, 1869.

Under the reorganization of 1866, the captains were distributed as follows: To the 14th Infantry, Captains Ilges, Smedberg, Krause, Wharton, Weir, Van Derslice, Bainbridge and Vernou. To these were added Captains Hamilton and Davis for the two additional companies.

Captains D. B. McKibbin, Brown, O'Beirne, Downey, Miller, Perry and Fergus, were assigned to the 32d, and Captains Ross, Clay, Coppinger,

Brady, Walker, Sinclair, Henton and Browning were assigned to the 23d Infantry.

Of the field officers the 14th retained Colonel Lovell and Lieutenant-Colonel Wallen; Maj. L. H. Marshall went to the 23d and Major Chapin to the 32d. In January of 1867, the 14th Infantry was distributed at the following stations: Yuma, McDowell, Mojave, Lincoln and Camp in Skull Valley, without question the worst in the country. During this tour of duty nearly every monthly return contains a record of Indian scouts; some months nearly every company would be out. In September, 1868, the distance marched by these scouting parties aggregated 1000 miles, equivalent to double the distance elsewhere. Two companies marched 350 miles in August. The skirmishes rarely rose to the dignity of a battle, but they taxed the courage and skill of the participants to the utmost. One of the commonest entries is that of "mail carriers killed by Indians." Several hundreds of miles of wagon road were made by the regiment, and when the men were in camp they were almost constantly engaged in building barracks and quarters.

In the reorganization of the Army in 1869, the 45th Infantry, one of the Veteran Reserve regiments, was consolidated with the 14th Infantry. In compliance with S. O. No. 17, A. G. O. 1869, the 14th Infantry was transferred to Nashville, Tenn., the headquarters of the 45th Infantry, taking with them the officers, non-commissioned officers and ten men of each company. The other enlisted men were discharged or transferred to other regiments remaining in the Department of Arizona. The consolidation was carried out, the result appearing in the monthly return for July. The field officers assigned to it were Col. C. S. Lovell, Lieut.-Col. Geo. A. Woodward and Maj. M. M. Blunt. Lieutenant McCammon was made adjutant and Lieutenant Steele was retained as quartermaster.

The captains of the reorganized regiments were: Ilges, Krause, Van Derslice, Freudenberg, Trotter, Hamilton, Bainbridge, Carpenter, Burke and Davis. Their stations were Nashville, Humboldt, Chattanooga, Louisville, Jeffersonville, Lebanon and Union, W. Va.

In April, 1870, the regiment was transferred to Fort Randall, Dakota, on account of a threatened Indian war. In August it was transferred to the Department of the Platte, with headquarters at Fort Sedgwick, the regiment and post being under Lieut.-Col. G. A. Woodward. In the following March (1871) the headquarters was transferred to Fort Laramie, Wyo., where General John E. Smith reported and assumed command. Colonel Lovell had been retired December 15, 1870. General Gordon Granger, a colonel unassigned, was assigned to the regiment, vice Lovell, but on the 20th of December General Smith, who had been assigned to the 15th Infantry, was transferred to the 14th, General Granger at the same time being assigned to the 15th Infantry. Colonel Lovell died very soon after his retirement. He was loved and respected by the regiment. He was sincere, courteous and just, a good soldier and a good friend. The new colonel was a very different man. From all accounts of him he knew little and cared less for the traditions of the Service. He was a rough and ready fighter, who had done good service as a volunteer general. He would have led his

regiment into a fight as gaily as into a frolic, but opportunity was never given him.

In February, 1874, Lieutenant H. Robinson was killed in an Indian fight near Laramie Peak, while guarding a supply train. In the following August the regiment went to Utah, with headquarters at Fort Douglas. Four companies went on to Fort Cameron under Lieutenant-Colonel Woodward.

While this battalion was at Cameron, the Mormon Bishop John D. Lee was arrested and held there as a prisoner, pending his trial as the leader of the band of Danites (or destroying angels) who perpetrated the Mountain Meadow massacre. After his conviction he had his choice under the laws of Utah, as to whether he should be hung, beheaded, or shot. He chose the latter method of execution. To carry out the rule's of poetic as well as moral justice he was taken to the scene of the massacre and shot to death by musketry in March, 1879. A detachment under Lieutenant Patterson was sent down to preserve order. An attempt was made to convert Lee from the error of his ways, while he was confined at Cameron, but he maintained the scriptural doctrine to the last, "that the enemies of God should be exterminated root and branch," and finally met his fate with the equanimity of a martyr.

In 1876 the Sioux War broke out which opened up with the Custer massacre and the repulse of General Crook at the Rose Bud. In June, companies C, B, F and I (Burke, Kennington, Tobey, Taylor, Yeatman, Murphy and Calhoun), were sent to join Crook's column.

At Fetterman they met detachments from the 4th and 9th Infantry. The infantry column was placed under the command of Major Alexander Chambers, 4th Infantry, and hastening to join General Crook on the Little Goose Creek, enabled him to assume the offensive. Their only battle was at Slim Buttes, September 9th, where twenty-seven Indians were killed.

This column marched in three months 1139 miles. It was on the march from the Little Missouri to the Black Hills that the whole column was nearly reduced to starvation. Another company on escort duty marched 377 miles in one month. In November Companies D and G, under Captain Krause, were in (Crook's) the Powder River campaign, and were with McKenzie at the battle of Crazy Woman's Fork, November 26th, coming up with the infantry under General Crook. This column marched 735 miles. The officers present were Krause, Van Derslice, Hasson, Austin and Kimball. In 1877 one company was in the Nez Percé campaign and five under Major Bryant in the Bannock War, but they did not have a battle. Three companies, Trotter's, Krause's and Van Derslice's, were out the next year after the Bannocks.

In 1879 four companies, E, I, H and K, under Trotter, Carpenter, McConichie and Taylor, and Major Bryant commanding, were hurried down to the scene of the Thornburgh massacre, but arrived too late to get into the battle. But they did have all the hardships and privations of a hard Indian campaign.

In all the Indian campaigns of the regiment, their endurance, patience, vigilance and bravery were tested to the utmost. They suffered from

the most suffocating heat in Arizona and the most intense cold in Wyoming.

The Apaches and the Sioux were formidable enemies, but they dreaded them less than sand storms and snow storms, scarcity of food and bad water. Many men broke down under these trials, who easily endured all the hardships of the Rebellion.

Besides the battles mentioned in the narrative, detachments of the regiment were engaged in the following skirmishes:

February 23, 1866, Captain Walker and Lieut. T. F. Tobey with a detachment of fifteen soldiers of the 14th Infantry and twelve Oregon Volunteers, attacked and defeated a band of Snake Indians on Jordan Creek, Oregon, killing 18 and wounding 2 Indians. One man of the 14th was killed and 1 wounded.

On October 10, 1867, Captain Krause with a detachment of twenty-five men of the regiment attacked a Rancheria, twenty-five miles from Camp Lincoln, defeating the Indians, killing and wounding a number and capturing a lot of arms.

In a fight near Aqua Frio Springs, Arizona, November 13, 1867, Lieut. A. J. Converse and two men of Company C were wounded. Indians repulsed.

April 27, 1867, Lieutenant Western, with a detachment of ten men from Camp Logan, attacked a band of forty-five hostile Indians on Silvies River, fording the river neck deep. The Indians were defeated, 6 killed and a number drowned in trying to escape. Thirty-two horses and large amounts of supplies were taken. Complimented in orders (G. O. No. 32 Department Col. 1867).

Lieutenant Hasson, in the months of September, October, November and December, 1867, in command of detachments from his post, had engagements with the Apaches at Three Buttes, Hualopais Valley, Hitchie Springs and the Willows.

March 25, 1868, Captain Ilges and eight men attacked fifty Indians with stolen cattle at Cottonwood Springs, Arizona. The engagement lasted twenty minutes. Private Logan, Company B, was wounded. One Indian was killed and two wounded.

February 27, 1869, in an attack made by Apaches on a train near Camp Grant, Arizona, two men were severely wounded, but the attack was repulsed.

May 6, 1869, in an attack on a train near Grief Hill, one private of the regiment was killed, but the Indians were so impressed by the operations of breech-loaders, then used on them for the first time, that they regularly stampeded.

In May 1881, Colonel Smith was retired and was succeeded by Lewis Cass Hunt, who was colonel of the regiment until his death, September 6, 1886.

In August 1881, the headquarters of the regiment was transferred from Camp Douglass, Utah, to White River, Col., and in May 1883, they were removed to Fort Sidney, Neb., and in July 1884, to Vancouver Barracks, W. T.

In this department the regiment has had only the ordinary routine duty to perform, except the suppression of the anti-Chinese riots in Seattle in November 1885 and February 1886.

In September of this year Colonel Anderson was promoted to the colonelcy of the regiment *vice* General Hunt. Lieutenant-Colonel Woodward was promoted to the colonelcy of the 15th Infantry on January 10, 1876. Lieut.-Col. Henry Douglas was promoted in his place on that date; he was promoted colonel of the 10th Infantry, July 1, 1888, and was succeeded by Lieut.-Col. I. D. DeRussy. Major M. M. Blunt was promoted October 4, 1874, lieutenant-colonel of 25th Infantry and was succeeded as major by Major Montgomery Bryant, who held the position until June 1882, when he was succeeded by Major W. F. Drum, who in his turn was promoted December 8, 1886, and was succeeded by Major Charles A. Wikoff, the present major of the regiment.

The regiment has as it stands to-day, twenty officers with war records, not counting those who have since served in Indian wars, nearly all of whom have been wounded in battle. Many of our "comrades and companions" have returned to civil life and are working honorably and successfully in civil pursuits. But the grave has closed over most of our men of '61.

"The brightest have gone before us
The dullest remain behind."

Nevertheless, those who remain, cherish the hope that those who succeed us may be encouraged by this history to do what the men of the 14th Infantry have always tried to do—THEIR DUTY.

APPENDIX.

ROSTER OF COMMISSIONED OFFICERS, 14TH INFANTRY.

Colonel, THOMAS M. ANDERSON.

Lieutenant-Colonel, I. D. DERUSSY. Adjutant, 1st Lieut. R. T. YEATMAN.
 Major, CHARLES A. WIKOFF. Quartermaster, 1st Lieut. J. H. GUSTIN.
 A. Captain A. H. BAINBRIDGE, 1st Lieut. G. T. T. PATTERSON, 2d Lieut. W. B. REYNOLDS.
 B. Captain P. HASSON, 1st Lieut. J. MURPHY, 2d Lieut. J. P. O'NEIL.
 C. Captain D. W. BURKE, 1st Lieut. WM. W. McCAMMON, 2d Lieut. E. T. WINSTON.
 D. Captain C. B. WESTERN, 1st Lieut. F. S. CALHOUN, 2d Lieut. H. C. CARELL, JR.
 E. Captain F. E. TROTTER, 1st Lieut. J. A. BUCHANAN, 2d Lieut. F. F. EASTMAN.
 F. Captain T. F. TOBEY, 1st Lieut. C. A. JOHNSON, 2d Lieut. C. H. MARTIN.
 G. Captain C. H. WARRENS, 1st Lieut. W. P. GOODWIN, 2d Lieut. W. A. KIMBALL.
 H. Captain S. McCONIHE, 1st Lieut. S. J. MULHALL, 2d Lieut. W. R. SAMPLE.
 I. Captain G. W. DAVIS, 1st Lieut. F. TAYLOR, 2d Lieut. A. HASBROUCK, JR.
 K. Captain G. S. CARPENTER, 1st Lieut. R. A. LOVELL, 2d Lieut. W. K. JONES.

Letters with valuable information have been received from Generals E. D. Townsend, W. B. Franklin, T. F. Rodenbough, U. S. A.; Lieutenants J. A. Buchanan and Frank Taylor, 14th Infantry; Colonels William R. Smedberg, E. McK. Hudson and J. J. Coppering; Captains A. H. Bainbridge, 14th Infantry, T. M. K. Smith, 23d Infantry, and Geo. M. Downey, U. S. A.; Major P. W. Stanhope, U. S. A.; Captain Chambers McKibbin, 15th Infantry.

I am indebted to the Adjutant of the Regiment, Lieut. R. T. Yeatman, for much diligent research and compilation, also to Captain Tobey and Lieutenant Eastman for assistance, and to the Sergeant-Major and his clerks for intelligent and faithful work.

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HOW OUR BODIES ARE NOURISHED AND THE
PROPER DIET OF THE SOLDIER.*

By W. E. WATERS, SURGEON, U. S. A.

LIFE in the animal kingdom from its simplest form in the amoëbia, which is only a homogeneous mass of protoplasm to the complex organisms of higher animal life, which culminates in man, is a series of changes, including growth, decay and death.

The little protoplasmic semi-liquid animalcule to which I have referred as the lowest order of animal life has inherent in it the power of motion—it possesses irritability, one of the characteristics of animal life, and coming in contact with its pabulum, envelopes or flows around it, extracts its nutriment and flows away, which constitutes its whole process of eating, digesting and assimilating. It grows by simple absorption of nutriment, and when it reaches maturity, the cell, for it is nothing more, divides into two, identical with the first, and so the process goes on, dividing and redividing, the older maturing and dying, the younger multiplying.

The same characteristics of growth, maturity, decay and death

*Read before Vancouver Branch, M. S. I., April 8, 1890.

occur in our bodies, though the processes are almost infinitely more complex. In the amoeba the nutriment enters at any part of its body with which it may come in contact, and the portion of it not appropriated as an immediate constituent of its body passes out at any other equally indifferent and most convenient part. It is devoid of digestive apparatus, and does not even contain a cavity for the food.

The higher animals in their complexity of organization cannot be nourished in a way so simple, though the chemical elements which nourish one are identical with those that nourish the other. These consist of oxygen, carbon, hydrogen, nitrogen, and a few metallic substances, the nitrogen being the characteristic element of animal life as carbon is of vegetable life.

The body to be nourished is composed of precisely similar elements. All the natural in it, and all the energy it develops comes from without. The pabulum furnished must contain the relative proportion of the nutrients required by the muscles, brain, nerves, bones, cartilage, tendons, skin and viscera. All these parts are constantly wearing out, and throwing off in destructive assimilation the worn out material, which must be replaced by new, and not only in a quantity to compensate for the loss, but what may be needed for potential energy expended in the production of animal heat and mental and physical exercise.

If a quantity of nutriment is taken and converted into organic products in the body in greater amount than the body throws off in effete material or expands in force, we gain in weight; but if it is not equal to the expenditures, then the tissues already formed are drawn upon to make up the deficiency and we lose in weight. So there is a constant income and outgo, and when all the elements of the income are sufficient to meet the outgo and the excretory organs are not taxed to rid the body of an excess, there is perfect nutrition.

About 61 per cent. of the body of an average healthy man is water and about 6 per cent. mineral—the latter principally in the bones, of which they constitute nearly one-third.

The remaining 33 per cent. comprises substances known as organic compounds, of which the albuminous principles or *protein* comprise about 18 per cent. and fats 15 per cent. There remains in the body a very small proportion of carbo-hydrates.

While our bodies originate nothing in themselves to nourish or energize they contain mechanisms wonderful in their construc-

tion, and functions for converting the natural aliments into organic compounds that do nourish them.

These consist of the digestive apparatus in which food is prepared for its further diffusion ; of the circulatory system, and the blood, through which there is a rapid distribution of the materials prepared for use by the digestive apparatus ; of the glandular system, for the further preparation of material for nutrition after it has reached the blood, and for removing waste ; of the respiratory organs through which the oxygen is taken from the inspired air to assist in the production of heat and other forms of energy ; and of the nervous system, the most wonderful of all, by which the others are regulated and in which the intellectual faculties have their seat.

Vegetable life derives its nutriment entirely from inorganic principles ; animal life very largely from organic, and is impossible without such. In vegetables the inorganic principles of their nutrients are converted into organic, and when eaten by the animal are again changed in its body into inorganic in the form of carbonic acid. So there is a constant reciprocity going on between animal and vegetable life, each furnishing food for the other.

The nutriment upon which the complex machinery of animal life acts is not supplied in the form in which it enters into the various tissues. We cannot take the oxygen required in the water we drink, which is composed of this element and hydrogen ; but must inhale it in the atmosphere ; nor nitrogen by breathing any quantity of atmospheric air, which contains it also, as a substitute for what we eat in our roast beef ; nor will a powder of diamond dust or charcoal answer for the carbon supplied in the sugar and starch in our vegetable diet, and the fats in our mutton chops and breakfast bacon.

The following are the forms in which nutrients are supplied : The albuminoids and gelatinoids composing the protein or albuminous principles we consume in the form of albumen in eggs, casine in milk, the albuminoids in meat and fish (this constitutes the most important), gluten in flour, and the nitrogenous principles in beans, peas, potatoes, rice, etc. These vegetables, although containing more or less protein, are richer in the carbo-hydrates. Meat and fish contain extractive matters that make them agreeable to the taste, but are devoid of nutriment. The fats we get in the fats of all kinds of meats and

fishes; in the fat of milk, which in the form of butter is almost pure fat; in the vegetable oils, and in fats contained in wheat or rye flour, corn-meal, oatmeal, etc.

The carbo-hydrates, comprising sugar and starch, we eat in the form of sugar, an almost pure carbo-hydrate in rice, which contains about 80 per cent.; in wheat flour about the same; in corn-meal and oatmeal with about 68 per cent., and in potatoes of about 20 per cent. The succulent vegetables contain carbo-hydrates, but in much smaller proportions. They are found also in fruits, but not in such quantities as in the leguminous vegetables I have named.

Added to these water, and a few inorganic substances, as iron, lime, sulphur, phosphorus, etc., constitute all that is needed in our diet.

The necessary inorganic substances are found in the foods I have mentioned, except salt, which must be added.

I have referred to the animal body as being constituted of certain chemical elements; to the change it is constantly undergoing; to the necessity of material from without to replace the waste going on within; and to the adaptability of nature's supplies for the purpose, and to the form in which they are furnished.

Let us now consider how these nutrients are utilized. The wants of the body vary from many causes. The diet of infancy differs from that of childhood; the diet of childhood from that of the adult, and the diet of the adult at rest from that required by labor. A resident of a cold country requires different food from one living in a tropical region, and the food on which one individual will thrive will not always nourish another of similar physique, habits and environment.

The diet of the infant is furnished in the mother's milk in just such proportions of the constituents of the nutritive elements as are adapted for the infant. This diet, already compounded by nature, is the only perfect one. The diet of later periods of life must be from such articles as the intelligence of man has enabled him to select for the wants of his system. Taste and appetite are the chief factors aiding in the selection of our foods. As a rule nature furnishes but few substances readily obtainable by the lower animals, or man, in which taste is not a good guide in selecting and appetite in using. It is a false maxim, "You should rise from the table with a good appetite." Appetite is a

normal condition, hunger an abnormal. Appetite is the pleading of nature for food, hunger her complaint when it is not furnished. The instinct of man with his taste not perverted or appetite stimulated are then good guides in the selection of food.

A preponderance of one kind of diet will not compensate for a deficiency in another except to a limited extent.

The diet of an adult should consist of nitrogenous and non-nitrogenous substances in the proportion of about one to four, so in order to get the necessary amount of food into the body in the form of meat, if we ate that alone, it would be necessary to eat, say of roast beef, about four times as much as would be required if vegetables in some form were eaten with it in order to get a normal quantity of a non-nitrogenous element in the fat.

Lean meat is the principal source of nitrogenous supply, but it is also found in a vegetable diet. The hard bread of the ration contains 15 per cent.—soft bread only about 8 per cent. Oatmeal and beans have about 12 per cent., corn meal and macaroni about 9 per cent., rice 5 per cent., and potatoes 2 per cent.

There are also small quantities of other nitrogenous substances in meat and fish called *extractive matters*. These are not nutritive, but extremely useful in making the articles which contain them palatable. They give to roast beef and broiled steak, to pomino and white fish, to canvas back duck and woodcock their pleasant taste and savory odor, and to beef-tea its invigorating and stimulating properties.

Protein is the most important of all the elementary principles. It is the nitrogenous basis of bone, muscle, tendon, skin and blood. It constitutes over 18 per cent. of the substance of the body. The foods containing it might be called the more stable of the nutrients, for the protein in them remains protein in the body. The behavior of mineral substances is similar, but it is different with others.

The quantity of fat in the body is not dependent on the amount of that substance we eat. A man will starve on a diet of fat alone. From it animal heat is evolved, and its source is principally the carbo-hydrates (sugar and starch) which decompose to form it. This has been demonstrated in experiments on pigs. One of these animals, which had been fed on carbo-

hydrates, was found to have accumulated 472 parts of adipose tissue during the time it had eaten 100 parts of fat.

The fats in the body fill irregularities over muscles, and are deposited in thick layers elsewhere, as over the abdomen of obese persons, and they constitute a large part of the brain and spinal cord. Fat is also interspersed with the muscular fibres, where it is in very small particles, and can be seen only with the microscope. This portion of fat, when absorbed, is replaced by water, so that a man may be growing lean without losing in weight.

The average human body consists of 60.6 per cent. water, 18.2 per cent. of protein, 15.5 per cent. of fats, 5.6 per cent. of minerals, and only .10 of 1 per cent. of carbo-hydrates. In a normal diet, as we shall see hereafter, a man eats nearly three times as much of carbo-hydrates as of protein and fats combined. Why this discrepancy?

These elements are by no means similar to the non-nutritious food of ruminating and other animals, but have most important functions in the animal economy. They are to man what coal is to the engine. Their combustion furnish energy for all the vital functions of the body, and with fats form the source of animal heat so essential to life. The carbo-hydrates then are either burnt up in the body or remain in the form of fat. With this digression from foods, to what they become and what they do, let us return to the consideration of the former.

We take in our food, and drink not less than 70 ozs. of water in 24 hours. Water is not a nutrient, though highly essential to nutrition in dissolving soluble parts of food, and liquefying other parts not soluble, so that they may be taken up in the blood-vessels and lymphatics. It is also necessary in keeping the blood sufficiently liquid, and holding in suspension substances in the secretions and excretions from the body.

The inorganic elements are found in most foods, and salt is the only one that is furnished as a distinct article of diet.

Phosphorus is an inorganic substance found more largely in the brain than elsewhere. Much discussion has arisen as to whether foods containing it are not specially required in the diet of brain-workers. Many scientific men at one time, among them the distinguished Agassiz, claimed that it should be, and recommend fish as a very desirable food for those engaged in intellectual pursuits.

The theory has not been sustained by recent scientific investigations. Mark Twain availed himself of this as a subject for one of his inimitable humorous articles. He writes the following letter to an aspiring author who applies to him for advice:

"YOUNG AUTHOR: Yes, Agassiz *does* recommend authors to eat fish, because the phosphorus in it makes brains. So far you are correct. But I cannot help you to a decision about the quantity you need to eat—at least, with certainty. If the specimen composition you send is about your fair, usual average, I should judge that perhaps a couple of whales would be all you would want for the present—not the largest kind, but simple, good middling-sized whales."

The fallacy concerning phosphorus food probably arose from the fact that brain-workers are usually persons of sedentary habits, and eat too much rich nitrogenous food. Sir Henry Thompson remarks on this subject as follows:

"The value of fish to the brain-worker" is on the ground that it "contains in smaller proportion than meat those materials which, taken abundantly, demand much physical labor for their complete consumption, and which without this, produce an unhealthy condition of body more or less incompatible with the easy and active exercise of the functions of the brain."*

We have considered the kinds of nutriment the body in health requires, whence obtained, and how appropriated, and shall now speak of the quantities of foods necessary under different circumstances. No absolute rule can be given to determine the amount of nutriment an individual requires. It varies in different individuals as much as the individuals vary in their physical conformation. Nor is there any rule based on size, age, temperament, constitution or occupation that is general in determining this question. Dietaries are calculated on a system of averages, and in large numbers of persons the aggregates vary so little that in following one carefully prepared there is seldom a waste or a deficiency in any of the articles composing it. The larger quantities consumed by some compensate for the smaller by others. A perfect diet is, in quantity and kind, that which so conforms to nature's requirements that in a healthy body all its nutriment is appropriated in making tissue or furnishing energy. A deficiency in quantity involves a draft on the tissues already formed, and an excess imposes additional labor on the secreting and ex-

* *Century*, July, 1887, page 251.

creting organs, causing disease. We have frequent examples of the latter in the kidney diseases of high livers, arising from the increased labor of these organs in ridding the blood of an excess of nitrogenous products resulting from over-eating.

The object of established rations for armies, and dietaries for other large bodies of people, is to furnish food in such quantities and of such kinds as are most productive of health and vigor at the least cost. In these the values of foods as tissue making and force producing are considered. Experiment and observation have pretty well determined the average amount of food required for man in a state of rest or quietude, and while performing moderate and laborious work. Different degrees of muscular exertion require different amounts of pabulum to sustain the body under it. If violent, and no more food is taken than during moderate exertion, then the fat already in the body is burnt in furnishing energy, fatigue follows, the body loses in weight.

I have already referred to the general division of foods into nitrogenous and non-nitrogenous—one tissue making the other energy liberating.

I will here call your attention to a most interesting and instructive series of articles in the *Century* for 1887, on the chemistry of foods, their nutritive value, potential energy, digestibility, etc., with descriptions in detail of experiments of recent date that have determined many important questions on the interesting subjects of which they treat. I am indebted to these for much assistance in preparing this lecture.

TABLE OF NUTRIENT MATERIALS AND REFUSE IN COMMON FOOD.*

| Articles. | Protein. | Fats. | Carbo-hydts. | Minerals. | Water. | Refuse. |
|---------------------------------|----------|-------|--------------|-----------|--------|---------|
| Beef, side, well fattened..... | 13.6 | 22. | .... | 1 | 43.4 | 20. |
| Beef, round, rather lean..... | 21. | 8. | .... | 1.5 | 59.5 | 10. |
| Beef, sirloin, rather fat | 15. | 14. | .... | 1. | 45. | 25. |
| Mutton, side, well fattened... | 13.5 | 23. | .... | 1. | 42.5 | 20. |
| Mutton, loin, (chops)..... | 12.5 | 29.5 | .... | 1. | 41. | 16. |
| Smoked ham..... | 14.6 | 33.9 | .... | 1. | 36. | 14.5 |
| Pork, very fat, salted..... | 2.7 | 76.3 | .... | 1. | 9.5 | 10.5 |
| Turkey, medium fatness..... | 15.5 | 5.5 | .... | 1. | 42.5 | 35.5 |
| Brook trout, whole..... | 9.5 | 1. | .... | .8 | 40. | 48.7 |
| Mackerel, whole, average.... | 10. | 4.5 | .... | 1. | 39.5 | 45. |
| Salmon, whole..... | 14.6 | 8.7 | .... | 1.2 | 40. | 35.5 |
| Salt codfish..... | 16. | 5. | .... | 1.4 | 39.7 | 42.4 |

*Calculated from Atwater's diagram in *Century Magazine*, May, 1887.

In 100 Parts.

| Articles. | Protein. | Fats. | Carbo-hydts. | Minerals. | Water. | Refuse. |
|-------------------------|----------|-------|--------------|-----------|--------|---------|
| Hens' eggs..... | 11.6 | 9.9 | .6 | .9 | 63. | 14. |
| Oysters, average..... | 6. | 1. | 3.5 | 2.5 | 87. | .... |
| Cows' milk..... | 3.5 | 3.5 | 4.5 | 1. | 87.5 | .... |
| Cheese, whole milk..... | 27.4 | 35.1 | 2.3 | 4. | 31.2 | .... |
| Butter..... | 1.5 | 86.5 | .8 | 2.2 | 9. | .... |
| Oleomargarine..... | ..... | 87. | .8 | 2.5 | 9.7 | .... |
| Lard..... | 98.6 | .... | .... | .... | 1.4 | .... |
| Wheat bread..... | 8.7 | 2. | 55.3 | 1.3 | 32.7 | .... |
| Beans..... | 23.4 | 2.6 | 57. | 3.6 | 13.4 | .... |
| Oatmeal..... | 15. | 7. | 68.4 | 2. | 7.6 | .... |
| Corn (maize) meal..... | 9. | 4. | 70.6 | 1.9 | 14.5 | .... |
| Rice..... | 7.3 | .7 | 79. | .5 | 12.5 | .... |
| Sugar..... | .... | .... | 97. | 1. | 2. | .... |
| Potatoes..... | 2. | .1 | 20.9 | 1. | 76. | .... |
| Turnips..... | 1. | .... | 7. | .9 | 91.1 | .... |
| Cabbage..... | 1.9 | .... | 7.1 | 1. | 90. | .... |

The nutritive value of food is not alone its standard of merit. Very nutritious substances are often very indigestible, as, for example, cheese, which contains twice as much of the nitrogenous element and more than twice as much fat as roast beef; but it can be eaten in only small quantities.

I shall now enumerate some of the more common foods, and refer to the characteristic features of each.

Milk, as I have said before, is the ideal food of infancy, but is not a suitable, exclusive, diet for the adult, as it does not contain the proper proportions of the several nutrients, and is not adapted for the occupations of that period of life, nor is it as easily digested by the healthy adult as by the infant.

The relative proportions of the different ingredients in milk differ in different animals. For instance, the cream in the milk of the Jersey cow is so out of proportion to that in the milk of the long-horned Texas bovine that one would not suspect from their composition that the milks were from animals of the same species.

Milk is an excellent diet for the sick, whose stomachs will often digest it better than any other food.

A much more important and generally used diet is *butter*, that valuable substance obtained from milk. When eaten with bread, in addition to its nutritive value its palatable taste enables us to eat a large quantity of the bread.

Oleomargarine is almost identical with butter, and of very

nearly the same nutritive value. It is made by extracting the stearin from the fat of beef or from lard, and adding a small amount of butter, which gives its flavor to the whole. The popular prejudice against the article has deprived many a poor family of a wholesome and agreeable food.

Eggs are composed of nitrogenous, fatty and mineral substances, and are therefore both tissue-making and heat-producing food. They are easily digested, and contain a concentrated nutriment.

Meat is the most universal article of man's diet. The flesh of a few domesticated animals, including birds, and other fowls, constitute the varieties of meats in our every-day use. They are cooked to prepare them for the table, but recent experiments have demonstrated that, except with very tough meat, the process of cooking is more to make it toothsome than of aid in making it digestible.

Of the several methods of cooking *roasting* retains the flavor and renders meat more digestible than any other. The old English way of suspending a joint of beef before an open fire in the fresh air, is *the* method of cooking meat *par excellence*; but it has fallen into disuse, both in this country and where it originated. *Broiling* is similar to roasting as regards the heat effects. It is adapted only to meats cut in slices, as steaks and chops. Our roasting is the English baking, and ranks next after broiling. Roasting, broiling or baking should be with a hot fire, so as to coagulate a film of albumen on the surface, thus retaining the agreeable extractive matters, which are volatile. *Boiling* is not so good a method except for salt meats. When adopted, the water should be very hot, so as to act on the surface of the meat in the way dry heat acts in roasting or baking or broiling. In making soups, however, the meat should be put into *cold* water, and the temperature raised gradually, so that the juices may be thoroughly extracted.

Stewing is an excellent way of cooking meat, particularly if tough. A small quantity of water is used, and all the juices, both nutritious and savory, are preserved in the stew. This method is vastly preferable to boiling. The latter should be resorted to only when the water in which the meat is boiled is used as soup.

Frying is a method that should never be adopted when any other way of cooking meat is possible. It is a suitable way

of cooking small fish and a few other articles. Overcooking meat renders it less digestible.

The time required for digesting meats varies with the kind of meat and the mode of cooking. Raw beef is digested in two hours, a shorter time than when cooked in any way, broiled, rare, $2\frac{1}{2}$ hours; well done, in 3 hours; roasted, rare, 3 hours; well done, 4 hours. Roast veal requires about 4 hours and roast fresh pork an hour longer.

The concentration of nutrients, either animal or vegetable, into compact forms is more useful as a matter of economy, convenience or expediency in emergencies, than as a promoter of health. Many military critics claim that the success of the German army, in the Franco-Prussian War of 1870, is as much attributable to the sausage makers of Berlin as to the strategy of its generals. Their field ration in the form of sausage enabled the German armies to move with little transportation and great celerity.*

Tough meat is not thoroughly masticated, or digested, and portions of it containing nutrient pass out of the bowels as excretion. Fluids and semi-fluids are more digestible than solids. The meats of young animals, with the single exception of veal, are more digestible than the meats of older animals.

The more nutritive vegetable foods are the *cereals*, which contain all the alimentary principles. *Wheat flour* is a more universal article of diet than any other.

Indian Corn, in the form of meal, is a staple article of food in our Southern States. It contains about the same proportion of carbo-hydrates, more fat, and less protein than wheat flour.

Rye, buckwheat, oats and barley are ground into flour, and eaten in the form of bread and mush. Of recent years a popular vegetable food of Scotland has become more common in this country, and the coming generation is likely to be more robust from the growing popularity of oatmeal.

Rice is a common article of diet, but is not as much appreciated as it merits.

Beans and peas, in addition to their carbo-hydrates, contain a large percentage of protein and make a very useful and economical diet for laboring people. They constitute an important part of the Army ration. With the addition of fat pork or bacon

* *Encyclopædia Britannica*, vol. 7, page 202.

they make a very nutritious diet. The pork and beans of New England has become a popular dish even in the land of hog and hominy. These two common diets in the North, and in the South, are about equally nutritious. Beans and peas cannot be used constantly as some other vegetables, particularly by persons leading inactive lives, as they become unpalatable, and cause indigestion.

The potato, of all vegetables, is the most appreciated, though it contains but 20 per cent. of carbo-hydrates and a little protein, while rice contains more protein and very much more of carbo-hydrates. Their relative nutritive value is misleading, without reflection. Ounce for ounce, the dry rice is twice as nutritious as potatoes, but in cooking rice the water it absorbs makes the boiled article about equal in nutritive value with the same quantity of boiled potatoes, which in their natural state contain so much water that little is absorbed in cooking.

The green vegetables of a truck garden, such as cabbage, turnips, onions, beets, tomatoes, green peas, string beans and lettuce are all composed largely of water, and contain but little nutriment.

The most important of the inorganic foods is *salt*, which, in addition to its use in forming tissue, enters into a chemical combination in the stomach, forming hydrochloric acid, a very essential constituent of gastric juice.

The other inorganic principles, such as phosphorus, iron, lime and sulphur, abound in the organic foods I have enumerated. There are other substances, known as "accessory food," such as pepper, mustard, vinegar, etc., which improve the taste, and, in proper quantities, aid digestion, but their excessive use is harmful to the mucous membrane of the stomach. To this class may be added coffee, tea and chocolate, and also distilled and fermented liquors.

The division of aliment into food and drink is improper. Some liquids, as cream, are very rich in nutrients. Whether they contain nutriment or not, liquids, when used as adjuncts to other aliments, constitute food. Let us now consider how these foods may be combined, and in what proportions to best subserve the nutrition of man.

I have referred to the body as made up of certain elementary principles, and to the fact that it must be nourished by food containing these. I have classified foods into two general

classes of nitrogenous and non-nitrogenous, and have enumerated the common foods of the three natural kingdoms.

I shall now consider how we can best combine and utilize the most useful of these. In doing so I do not propose to discuss the elaborate *ménü* of a fashionable dinner, the object of which is not to serve such articles, and in such quantities, as are most conducive to health, but rather to make such combinations and successions of dishes as will gratify the palate for the longest possible time, aided by wines as varied as the foods, until the stomach can hold no more, regardless of the consequences to the liver and kidneys, and the discomforts of the following day.

I shall consider what foods are best as the common diet of man, and particularly of that class who must count the cost. This will include the rations of the soldier, in the selection of which the two principles—the cost and the healthfulness of the diet are most important.

A constant diet of one article will always, after a time, become distasteful. Hence it is desirable to know what foods furnish the most nutriment, and what nutritious foods can be eaten in proper quantities for the longest time. This is an important consideration for Army officers, particularly company commanders, in arranging the diet of their men, not only as regards the ration, but in the purchases they make from their company funds.

The occupation of a man determines largely how much and what kind of food he should eat. I have arranged the following table showing the quantities of the nutrient principles of food required by an adult man under different circumstances, and in different occupations.

NUTRITIVE ELEMENTS IN DIFFERENT DIETS.

| | Protein. | Fats. | Carbo-hydrates. |
|---|----------|-------|-----------------|
| | ozs. | ozs. | ozs. |
| Bare existence diet of London prisons (3 weeks).... | 2. | 6. | 14.7 |
| Hindu prison labor diet..... | 2. | 0.60 | 19.83 |
| Diet of quietude (Playfair)..... | 2.5 | 1. | 12. |
| Dobell's moderate labor diet..... | 3.5 | 3.3 | 10.7 |
| German labor diet..... | 4.2 | 2. | 17.6 |
| U. S. Army ration..... | 4. | 3.91 | 13.47 |
| French Army ration (in time of peace)..... | 4.33 | 1.25 | 18.04 |
| " " " (in time of war)..... | 4.58 | 1.23 | 18.75 |

| | Protein. | Fats. | Carbo-hydrates. |
|--|----------|-------|-----------------|
| | ozs. | ozs. | ozs. |
| German Army ration (smaller ration)..... | 4.8 | 1.1 | 17.4 |
| " " " (larger ration)..... | 5.7 | 1.4 | 18.6 |
| Austrian Army ration (in time of peace)..... | 3.7 | 1.6 | 17.0 |
| " " " (in time of war) (mean) ... | 4.5 | 3.2 | 22.8 |
| Russian Army ration..... | 5.8 | 1.0 | 25.0 |
| Prize fighters training diet..... | 9.8 | 3.1 | 3.27 |

You will observe in these diets the great difference both as to quantity and kind. The prison diet is one, on which, it is supposed a man can live for the period of three weeks, without in the least endangering his health. This is given only when the prisoner is in confinement.

Playfair, who has given much attention to this subject, thinks that a man may live in good health for a long time on his "diet of quietude," but he must avoid muscular or mental exercise. In this connection it is well to remember that there is no such thing as *absolute rest* of the muscular system during life. The involuntary muscles concerned in breathing and the heart are in constant use, and their waste, as well as the force required in their movements must be supplied by food.

In proportion to the degree of muscular exertion should be regulated the quantity of aliment a man should eat. No class of people have this law of nature's demands more strikingly demonstrated to them than army officers on a long march with troops. We see how insufficient is the ordinary diet of garrison life for the wants of the soldier under such circumstances.

In the quantities of the alimentary principles of food, given in the table, you will notice that in all the army rations, and in the German labor diet this fact has been well considered. The importance of the nitrogenous elements seems to have been realized in arranging all of them. In the larger ration of the German Army, and in that of the Russian Army the protein element is larger than in the others, but in them there is a corresponding reduction in fats and an increase again in the carbohydrates, thus making their nutritive values not dissimilar. Carbo-hydrates we have seen are converted into fats in the body, and protein is also, when there is an excess. An illustration of how a change of kind and quantity of food will affect laboring men, in a warm climate, where it is supposed an animal diet is not essential, is the following:

"In building a railroad in Sicily, where the work was done by gangs of natives, and corresponding gangs of English workmen, the difference in the amount of labor performed by the two classes was so great that the contractor, in order to get more work done by the Sicilians, who ate little or no meat, to save expense of living, adopted the plan of paying the workmen partly in meat and partly in money, which resulted in the Sicilians performing an amount of work nearly equal to that of the English."*

The prize-fighter expects his strength and powers of endurance to be at their maximum when he enters the ring, and for several weeks preceding the contest he has a very different diet from that of his ordinary life, consisting of such food as goes to make muscular fibre. Only as much fat is eaten as is required to be consumed in furnishing energy and animal heat, and that he gets in his meat. Not a superfluous ounce is allowed to accumulate in his body. Such a diet is practicable only during the training period. If the protein in the large quantity of meat were not converted into muscular tissue, it would be eliminated as an excrementitious substance, to the injury of the secreting organs. Hence the most systematic training of the muscular system goes on while he is using this highly nitrogenous diet.

Let us now consider the quantities required of the several foods.

I have prepared in tabular form several dietaries arranged by Dr. Horace Dobell, of London, with a view of showing the different kinds of foods that furnish the same amount of nourishment, with the calculations of the quantities of the different elements in each, and in connection with them have given the rations of our Army, the English and the Italian armies.

The Italian ration is selected to be given in detail in this table as showing a different variety of diet from that of any other European army, and in contrast with the English Army. Dr. Dobell's tables you see are arranged with reference to the tastes and means of different individuals, specifying different articles of the same nutritive value, but varying in cost. Any one of the six he thinks will furnish the amount of nutriment a healthy man, taking moderate exercise, will require, adapted to persons of different constitutions and occupations. The good liver may arrange his bill of fare after

* *Encyclopædia Britannica*, vol. viii., p. 202.

diet table No. 1. The poor man of a calling requiring little muscular exercise, may arrange his after table No. 4, substituting at times the cheaper meats for fish. Individual tastes cannot be consulted in arranging dietaries for large numbers of men, when the cost and other circumstances must be considered. This is particularly the case in providing uniform rations for armies. In them, when peculiarities of taste are gratified, it must be at the expense of the soldier, or to some extent in our Army by purchase of articles by the company commander from the company fund. This is practicable only to a limited extent.

There always has been, and I suppose there always will be, as long as we have an army, discussions as to the sufficiency and adaptability of the soldier's ration. Theoretically the ration is sufficient. Practically, also. But a never failing desire on the part of some captains to accumulate large company funds, which they seem to consider as important as the proper feeding of their men, is not as uncommon as it should be, and gives rise to just complaint. The several constituents of the ration have been selected with a view to supplying the wants of the body of the soldier, on the principles I have explained. This has not been determined by chemical analysis and physiological research, by test-tubes and reagents, by retorts and spirit lamps, by delicate balances, by thermometers and calorimeters, by calculating how many foot-tons the combustion of a pound of fat will raise, or by experiments on innumerable dogs and other animals; *but by actual experience and observation.* The essentials of the ration were used before recent research demonstrated *how* they were so useful.

The nutritive value of our ration is in excess of that of other armies, and it is sufficiently varied to make some allowance for taste. The number of interchangeable articles in it is unusual. We have bacon or salt pork, fresh beef or mutton, canned fresh beef or salt; two kinds of wheat bread, or wheat flour or corn meal; beans and peas, rice or hominy; coffee, tea, sugar, salt, pepper and vinegar.

When the Army was scattered over remote and isolated posts in a country of hostile Indians, some of them more than a thousand miles from their depots of supply, and these posts furnished *annually* with subsistence stores, the ration, as a selection of nutritious, palatable, portable, and imperishable articles of food, could not have been much improved.

Situated as the Army is now with comparatively few posts remote from railroads, I think the addition of such fresh vegetables as potatoes and onions to the ration should be made, and not have the soldier look for his supply of these articles to the precarious yield of gardens (particularly post gardens as I have observed them), or the more precarious reliance on company savings for their purchase.

In proportion to the amount of fresh vegetables that may be added to the ration other parts, furnishing similar nutriment, may be withdrawn from it.

I would recommend that in lieu of the present ration, with its many interchangeable articles, two more restricted rations be adopted—one for garrison life and the other for field service.

The quantities and kinds of food appropriate for men on these different duties vary, and I think a saving of expense, besides furnishing more suitable food, would result from the change. Fresh beef cannot always be bought on the march, and most company commanders prefer hard bread to flour in the field. Bacon is sparingly used in garrison; hard bread never.

I would suggest that the garrison ration be made to consist of 20 ozs. of fresh beef, as at present, or 16 ozs. of corned beef (not the *salt beef* as formerly issued), in the proportions of four rations of the former to one of the latter: of 16 ozs. of flour, or soft bread, instead of 18 ozs.; of 18 ozs. of corn-meal, instead of 20 ozs.; of 10 ozs. of potatoes, or 4 ozs. of onions, and of 1 oz. of rice or hominy. The other accessory articles of the present ration to be incorporated in the quantities they are now issued. For the field ration I would suggest 14 ozs. of bacon or pork, instead of 12 ozs.; 18 ozs. of hard bread, instead of 16 ozs. or 18 ozs. of flour; 3 ozs. of beans or peas, instead of 2.4 ozs.; rations of coffee, sugar, salt, pepper, candles and yeast powder in same quantities as in present ration.

The allowance of fresh beef for garrison I believe to be ample. Beef, if properly corned shortly before using, and not the "salt horse," so called in war times (the soldier's name for the execrable salt beef then furnished), I think is an excellent food. It could be obtained, recently corned, from the beef contractor in the same way that fresh beef is furnished. It would make a good dinner meat once in five days, and excellent hash for breakfast the following morning.

Sixteen ounces of flour is ample if potatoes are furnished also. I believe it more conducive to economy to furnish only what is necessary, notwithstanding the fact that the money value of any surplus is divided among the companies for improving the diet of the men. Corn-meal is seldom or never issued, but it should be, and the quantity might properly be reduced.

Ten ozs. of potatoes or 4 ozs. of onions are added. I think there is but one opinion among officers serving with troops as to the advisability of this addition. There may be differences of opinion as to the quantity needed. I would strike out beans and peas, but retain rice and hominy as now issued. I would not depreciate the value of beans as a soldier's food, but think the substitution of potatoes and onions desirable. Beans are inexpensive, and the small quantities used in garrisons, when fresh vegetables are furnished, could be purchased, as potatoes and onions now are, when not raised in the gardens at the post. Hominy I regard with great reverence in recollection of my early life, when coarse hominy was served on my father's table with almost the regularity of potatoes, boiled for dinner, and what remained was fried for the next morning's breakfast. I have adopted the diet in hospital, and it seems very satisfactory to convalescent patients. If properly cooked it is almost always appreciated.

RATION OF THE ENGLISH ARMY.

| | Water. | Albuminates. | Fats. | Carbo-hydrates. |
|---|--------------------|--------------|-------|-----------------|
| Meat, fresh (less $\frac{1}{2}$ bone)... | 16 ozs. | 9.30 | 1.86 | 1.04 |
| Bread..... | 20 " | 8. | 1.60 | .30 |
| Or biscuit..... | 16 " | ... | ... | ... |
| Vegetables, fresh..... | 8 " | 6.40 | .14 | .01 |
| Or vegetables preserved..... | 2 " | ... | ... | 1.36 |
| Or rice or peas..... | 2 " | ... | ... | ... |
| Sugar..... | 2 " | .06 | ... | ... |
| Tea..... | $\frac{1}{2}$ " | ... | ... | ... |
| Coffee..... | $\frac{1}{2}$ " | ... | ... | ... |
| Salt..... | $\frac{1}{2}$ " | ... | ... | ... |
| Pepper..... | $\frac{1}{8}$ " | ... | ... | ... |
| Lime juice { when fresh vegetables { 1 " | ... | ... | ... | ... |
| Rum..... | $\frac{1}{2}$ gill | ... | ... | ... |
| | 23.76 | 3.60 | 1.35 | 13.13 |

RATION OF THE ITALIAN ARMY. (No. 1.)

| | Water. | Albuminates. | Fats. | Carbo-hydrates. |
|--|-----------|--------------|-------|-----------------|
| | ozs. | ozs. | ozs. | ozs. |
| Meat, fresh (less $\frac{1}{2}$ bone). | 5.29 ozs. | 3.17 | .63 | .35 |
| Bread..... | 32.37 " | 12.94 | 2.58 | .48 |
| Bacon..... | .52 " | .07 | .04 | .38 |
| Pastry (macaroni, etc.) | 7.05 " | .92 | .63 | .02 |
| Vegetables..... | 1.76 " | 1.40 | .03 | .003 |
| Salt and pepper..... | .70 " | .... | .... | .29 |
| | — | — | — | — |
| | 18.50 | 3.91 | 1.233 | 21.62 |

RATION OF THE ITALIAN ARMY. (No. 2.)

| | Water. | Albuminates, | Fats. | Carbo-hydrates. |
|--|-----------|--------------|-------|-----------------|
| | ozs. | ozs. | ozs. | ozs. |
| Meat, fresh (less $\frac{1}{2}$ bone). | 5.29 ozs. | 3.17 | .63 | .35 |
| Bacon..... | .52 " | .07 | .04 | .38 |
| Corn meal..... | 24.68 " | 3.70 | 2.22 | .98 |
| Vegetables..... | 2.64 " | 2.11 | .04 | .005 |
| Cheese..... | 1.16 " | .42 | .38 | .28 |
| Salt and pepper..... | 1.41 " | .... | .... | .... |
| | — | — | — | — |
| | 9.47 | 3.31 | 1.995 | 17.72 |

RATION OF THE ARMY OF THE UNITED STATES.

| | Water. | Albuminates. | Fats. | Carbo-hydrates. |
|--|--------|--------------|-------|-----------------|
| | ozs. | ozs. | ozs. | ozs. |
| Bacon.... 12 ozs. $\frac{9}{10}$ of .. | .54 | .31 | 2.63 | .... |
| Or fresh beef (or mutton) (less $\frac{1}{2}$ bone 20 ozs. $\frac{7}{10}$ of .) | 8.40 | 1.68 | .94 | .... |
| Or salt beef.... 22. ozs. | .... | .... | .... | .... |
| Soft bread or flour 18. " | 7.20 | 1.44 | .27 | 8.85 |
| Or hard bread... 16. " | .... | .... | .... | .... |
| Or corn meal.... 20. " | .... | .... | .... | .... |
| Beans (or peas)... 2.4 " | .31 | .57 | .07 | 2.31 |
| Orrice or hominy... 1.6 " | .... | .... | .... | .... |
| Coffee, green.... 1.6 " | .... | .... | .... | .... |
| Or coffee, roasted and ground... 1.28 " | .... | .... | .... | .... |
| Or tea..... 32 " | .... | .... | .... | .... |
| Sugar..... 2.4 " | .07 | .... | .... | 2.31 |
| Vinegar..... 32 gill | .... | .... | .... | .... |
| Salt..... 64 ozs. | .... | .... | .... | .... |
| Pepper..... .04 " | .... | .... | .... | .... |
| | — | — | — | — |
| | 16.52 | 4.00 | 3.91 | 13.47 |

TYPICAL DIETARIES.

(Dobell's Tables of Normal Diets.)

| FOODS. | Water. OZS. | Protein. OZS. | Fats. OZS. | Carbo-hydrates. OZS. |
|----------------------------|----------------|------------------|---------------|-------------------------|
| Meat, poultry or game*.... | 6 ozs. | 3.97 | .35 | .53 |
| Fish..... | 4 " | 3.19 | .66 | .03 |
| Bread..... | 10 " | 4.20 | 1.00 | .07 |
| Potatoes..... | 8 " | 5.81 | .14 | .... |
| Rice..... | 2 " | .18 | .10 | .01 |
| Sugar..... | 2½ " | .... | .... | 2.50 |
| Butter..... | 2½ " | .... | .... | 2.50 |
| Milk..... | 5 " | 4.34 | .25 | .18 |
| Coffee..... | 16 " | 15.77 | .... | .... |
| Tea..... | 16 " | 15.95 | .... | .... |
| | | 53.41 | 3.50 | 3.32 |
| | | | | 10.98 |
| No. 2. | | | | |
| Meat, poultry or game.... | 8 " | 5.29 | 1.80 | .71 |
| Bread..... | 12 " | 5.04 | 1.20 | .08 |
| Potatoes..... | 12 " | 8.71 | .20 | .... |
| Butter..... | 2 " | .... | .... | 2. |
| Sugar..... | 2 " | .... | .... | 2. |
| Milk..... | 5 " | 4.34 | .25 | .18 |
| Chocolate..... | 16 " | 15.20 | .07 | .32 |
| Tea..... | 16 " | 15.95 | .... | .... |
| | | 54.53 | 3.52 | 3.29 |
| | | | | 10.84 |
| No. 3. | | | | |
| Bread..... | 18 " | 7.56 | 1.80 | .12 |
| Cheese..... | 3½ " | 1.28 | 1.07 | .89 |
| Bacon..... | 3 " | .76 | .25 | 1.08 |
| Sugar..... | 1½ " | .... | .... | .... |
| Milk..... | 5 " | 4.34 | .25 | .18 |
| Chocolate..... | 20 " | 19.00 | .10 | .40 |
| Tea..... | 20 " | 19.93 | .... | .... |
| | | 52.86 | 3.47 | 3.55 |
| | | | | 10.51 |
| No. 4. | | | | |
| Fish..... | 8 " | 6.38 | 1.33 | .06 |
| Bread..... | 16 " | 6.72 | 1.60 | .11 |
| Potatoes..... | 8 " | 5.81 | .14 | .... |
| Butter..... | 2½ " | .... | .... | 2.50 |
| Milk..... | 8 " | 6.94 | .40 | .28 |
| Cocoa..... | 20 " | 19.10 | .10 | .60 |
| Sugar..... | 2..... | 1½ " | .... | .... |
| | | 44.95 | 3.57 | 3.55 |
| | | | | 11.13 |

* The meats in Dobell's tables are cooked and contain larger proportions of nitrogen as elements and less water than the uncooked meats in the other dietaries.

| | | Water. | Protein. | Fats. | Carbo-hydrates. |
|---------------|------|-------------|------------|------------|-----------------|
| | | ozs. | ozs. | ozs. | ozs. |
| No. 5. | | | | | |
| Bread..... | 16 " | 6.72 | 1.60 | .11 | 7.25 |
| Peas..... | 3 " | .41 | .65 | .04 | 1.40 |
| Bacon..... | 4 " | 1.14 | .33 | 2.50 | ... |
| Cheese..... | 2 " | .73 | .61 | .51 | .05 |
| Milk..... | 8 " | 6.94 | .40 | .28 | .34 |
| Coffee..... | 20 " | 19.71 | ... | ... | .28 |
| Sugar..... | 1 " | ... | ... | ... | 1.00 |
| | | <hr/> 35.65 | <hr/> 3.59 | <hr/> 3.44 | <hr/> 10.32 |
| No. 6. | | | | | |
| Milk..... | 40 " | 34.68 | 2.00 | 1.40 | 1.68 |
| Rice..... | 4 " | .36 | .20 | .02 | 3.26 |
| Eggs..... | 3 " | 2.15 | .45 | .32 | ... |
| Sugar..... | 2½ " | ... | ... | ... | 2.50 |
| Butter..... | 1 " | ... | ... | 1.00 | ... |
| Bread..... | 9 " | 3.78 | .90 | .06 | 4.08 |
| | | <hr/> 40.97 | <hr/> 3.55 | <hr/> 2.80 | <hr/> 11.52 |

I would make the field ration to consist of 8 ozs. of bacon and 6 ozs. of canned corned beef, or 20 ozs. of fresh beef; 18 ozs. of hard bread, or 20 ozs. of flour, 3 ozs. of beans or peas, with the accessory articles the same as in present ration.

Eight ozs. of bacon, of the kind issued to troops, with 6 ozs. of canned corned beef is not too much for a soldier on the march or in camp. Salt meat is not desirable as a constant diet, even in the field. Fresh beef should be authorized as an occasional substitute in the quantity of the present ration when it can be purchased and issued judiciously. When fresh beef is bought on the march or in camp there is usually great waste, it is a too common practice to buy more than will supply the immediate wants of the soldier, and he is allowed to gorge himself with a ration or two at a meal; or the excess will be cooked to save it, when it soon becomes unpalatable or uneatable. Let bacon be regarded as the standard and fresh beef as an extra to substitute for it when it can be had in quantities for immediate use. Considering the breakage in handling hard bread, and the increased demand for this, and all other foods on a march, I think the increase recommended reasonable. The necessity for an increase in the field ration was so manifest during the late War, that by an act of Congress the flour was increased from 18 to 22 ozs. and hard bread from 12 to 16 ozs. and an addition of one pound of po-

tatoes was allowed, when practicable, and when they could not be furnished the money value was added to purchase some other proper food. I would leave it discretionary with the commissioned officer to issue flour instead of hard bread when there are facilities for cooking.

Beans is the ideal food of the soldier in the field, and the allowance of them might very properly be increased the fraction of an oz. I have recommended.

The distinguishing features of the changes recommended are the addition of potatoes and onions in lieu of beans and peas, and the reduction in flour in the garrison ration, and the addition of corned beef, making with bacon an increase in the salt meat, and a small increase in beans, and omitting peas, salt pork and flour in the field ration.

PROPOSED GARRISON RATION.

| | Water. ozs. | Protein. ozs. | Fats. ozs. | Carbo-hydrates. ozs. |
|--|----------------|------------------|---------------|-------------------------|
| Beef, fresh, 20 ozs. (less bone) of..... | 9.60 | 7.92 | 1.07 | ..... |
| Corned beef, 16 ozs. of..... | 1.28 | 1.28 | .48 | ..... |
| Soft bread (or flour).....16 ozs. | 6.40 | 1.28 | .24 | 7.87 |
| Or corn meal.....18 " | .... | .... | .... | .... |
| Potatoes.....10 " | 7.40 | .20 | .01 | 2.10 |
| Or onions.....4 " | .... | .... | .... | .... |
| *Accessory articles same as in present ration. | .... | .... | .... | 2.31 |
| | — | — | — | — |
| | 24.68 | 4.68 | 1.80 | 12.28 |

PROPOSED FIELD RATION.

| | Water. ozs. | Protein. ozs. | Fats. ozs. | Carbo-hydrates. ozs. |
|--|----------------|------------------|---------------|-------------------------|
| Bacon.....8 ozs. | 1.20 | .70 | 5.86 | .... |
| Canned corned beef.....6 " | 2.40 | 2.40 | .90 | .... |
| Hard bread.....16 " | 1.28 | 2.49 | .20 | 11.74 |
| Or flour.....20 " | .... | .... | .... | .... |
| Beans.....3 " | .39 | .72 | .09 | 1.66 |
| †Accessory articles same as in present ration. | .... | .... | .... | 2.31 |
| | — | — | — | — |
| | 5.27 | 6.31 | 7.05 | 15.71 |

Dr. Parks in his works on hygiene recommends that the extract of meat be made an extra ration for the English Army to be issued as follows :

After a rapid march on the eve of battle, when there is no

* Coffee, tea, salt, pepper and vinegar not calculated.

† Coffee, tea, salt, pepper and vinegar not calculated.

time for preparing food. A small quantity mixed with red wine will restore strength wonderfully. Water can be used as a substitute for wine.

After a march in rainy weather made into hot soup will prevent bad consequences.

After an action it is invaluable to be carried about the field and given to the wounded before they are taken to hospital. He recommends that it be carried in small pots containing enough for ten or twenty men.

The suggestion is a most excellent one. But extracts, of which there are many varieties, might be furnished for the use of our troops in any one of the emergencies.

It is a part of the hospital supplies of our Army, but not furnished in quantities for such general use, and should be provided by the Subsistence Department for use in the field on the recommendation of medical officers.

At most military posts, where canteens have been established, the profits from them, together with the entire savings of the post bakery, which now go to the company funds, furnish money, with which company commanders can purchase additional subsistence for their men, even should there be no savings from the ration. The judicious expenditure of funds thus accruing will secure an improvement in the company dietaries. This has been done already at this and, I have no doubt, at all other well-conducted posts. In examining the lists of articles purchased with the company funds here I find that they very generally consist of such useful and proper food as fish, oatmeal, canned tomatoes and corn, dried fruits, macaroni, cheese, and many others. When potatoes, onions and cabbages are not raised at the post they constitute the bulk of purchases.

While there are improvements that may be desired, I think I may safely state that there is not an army in the world so well fed without any draft on the private funds of the soldier as the Army of the United States.

THE SUPPLY OF INFANTRY AMMUNITION ON THE FIELD OF BATTLE.

BY LIEUT C. L. BECKURTS, U. S. A.,
SIXTH INFANTRY.

IT is certain that in future actions, offensive or defensive, there will be many motives inducing long range and incessant fire action, and the problem of providing infantry soldiers with a great quantity of ammunition so that immediate use can be made of it, is a very important one.

It is absolutely necessary that each combatant soldier should have at his disposal a number of cartridges sufficient to carry out the services which are expected from the weapon he carries. Whatever the necessary supply may be, it is carried partly on the soldier, partly on wagons, carts, or pack animals, as may be most suitable to the country and enemy, and this supply must closely follow its battalions into action as far as is compatible with its safety. Besides this, a general supply of ammunition is distributed among the divisions and army corps.

The complex question is, how to bring the ammunition carried in the wagons, carts, etc., into direct contact with the individual soldier while in action. It is self-evident that an increased lightness in the ammunition itself will increase the supply carried by the soldier, and thus facilitate the prolonging of the fire action.

In the German Army each soldier carries 100 rounds. The company baggage-wagon carries 2880 rounds, giving 11.5 rounds per man. As this wagon does not generally follow the company to the battle-ground, this supply is not readily available, and is meant to fill up the pouches only during a halt, and when no other supply is available.

With each battalion are four company ammunition wagons. These wagons are drawn by four horses, and carry in all 38,400 rounds, in forty boxes of 960 cartridges each, or 38.4 rounds per man. The cartridges are distributed by means of canvas bags, six per wagon, each holding 500 rounds. Two or three men from each company are with its wagon to bring the ammunition to their respective companies. Two non-commissioned officers

and two privates are attached to the ammunition columns and taught how to conduct the wagons and keep them properly maintained.

Each army corps of 25 battalions contains four small-arm ammunition columns, each of 21 wagons (as above) for cartridges, 1 battery wagon, 1 forge, and 1 baggage-wagon.

The infantry ammunition column is further sub-divided into two divisions, one consisting of 12 ammunition wagons only, the other of the remaining wagons.

The ammunition columns of an army corps are divided into two échelons. The first échelon marches near the troops and forms a part of the fighting body; the second échelon marches with the trains in rear.

The second échelon supplies the first, and in turn receives its supplies from a mobile field ammunition park in rear, or from a stationary depot. Each échelon supplies 30 rounds per man.

In the French Army each soldier carries 78 rounds.

A 4-horse ammunition wagon is attached to each battalion, containing 18.144 cartridges, or 18.1 rounds per man. These wagons are similar in construction to our artillery caissons. Each chest contains 36 canvas bundles, furnished with a handle. The bundles contain 28 packages of 6 cartridges each. Each of these wagons is provided with 12 canvas wallets for carrying ammunition to the firing line. The drivers are taken from their respective battalions.

The artillery has charge of the army corps ammunition park, which is divided into two échelons.

The first échelon is divided into 6 sections, the first two carrying the infantry ammunition, 46.4 rounds per man. The second echelon consisting of 4 sections, carries 33 rounds per man. The first three sections carry the infantry ammunition. Following in rear marches the army park, consisting of 5 similar échelons, for the intermediate supply between the fixed depots and the army corps parks. Each of the two sections (for infantry ammunition) of the first échelon of the army corps park, consists of—

- 32 4-horsed ammunition wagons.
- 1 4-horsed forge wagon.
- 1 6-horsed forge wagon.
- 3 2-horsed provision wagons.
- 1 4-horsed battery wagon.

Total. 38 wagons in a section.

The personnel for each section is: 1 captain, 2 lieutenants, 1 quartermaster, 6 assistant quartermasters, 1 chief artificer, 1 quartermaster-sergeant, 6 foremen, 1 master and 2 assistant farriers, 2 blacksmiths, 2 carpenters, 6 pyrotechnists, 2 harness makers, 2 trumpeters, and about 150 drivers.

If the French require such an enormous force to conduct a train of 38 wagons, we have nothing to learn from them in that respect.

The Austro-Hungarian, Russian and English armies échelon their ammunition supplies in very much the same manner, all differing, however, in the way the ammunition is distributed in the different échelons.

The Russians have substituted for the company ammunition wagons, 2-wheeled, 1-horse carts, 16 carts for the 16 companies, and a regimental reserve of 17 carts. The regimental ammunition train is formed in two groups, one of 8 carts, which marches immediately in rear of the troops. The second group consisting of the other 8 carts and the regimental reserve marches in rear of the column.

The English assign to each battalion four 2-horsed, 2-wheeled ammunition carts. Each of these carts is accompanied by two pack animals. Pack animals can be substituted entirely for the carts, and it is found that each animal can carry 1200 rounds.

In all these armies the battalion and other supplies form successive magazines of ammunition. Beyond the ammunition carried in the army corps columns there can be no other immediately available supply on the battle-field. As a rule only the first sections of these columns would be available.

It is evident from the above that when it comes to matters of transportation we can safely rely upon our own knowledge and past experience.

Capt. G. S. Wilson in his article on "Small-arms Ammunition Supply" in the *JOURNAL OF THE MILITARY SERVICE INSTITUTION*, September, 1886, makes the following suggestion:

"In our Service I would suggest 20 rounds per man in the company baggage wagon, 70 in battalion wagons, and 70 in divisional train. Assuming that our infantry battalions will be of 4 companies of 100 rifles each, then 2000 rounds would be in the company baggage wagon, and 28,000 rounds--or, just one wagon load with the battalion train."

I am of the opinion that outside of the small amount carried

in the company baggage wagons, considering the nature of our country roads, that it would be best for us to pin our faith upon pack animals and 2-wheeled carts. As a matter of detail to facilitate the distribution of ammunition, these wagons should be painted a distinctive color, and should all be of the same pattern.

A well-equipped pack mule could carry 2000 rounds, but as the use of pack animals more than doubles the consumption of forage and the personnel of transportation, and as handling the ammunition twice a day would entail a great loss of time, wagons or carts should always be used when the roads permit. An auxiliary pack-train should, however, be available for use in case of mud.

The following table from Captain Mayne's valuable work, "Infantry Fire Tactics," gives the distribution of ammunition in the different European armies:

| Method by which the ammunition is carried. | Supply of Cartridges. | | | | | Remarks. |
|--|-----------------------|---------|-----------------|---------|----------|---|
| | Germany. | France. | Austro-Hungary. | Russia. | England. | |
| By the men..... | 100 | 78 | 100 | 84 | 70 | |
| In battalion wagons..... | 38.4 | 18.1 | 35 | 48 | 30 | |
| Total of first supply for fighting line..... | 138.4 | 96.1 | 135 | 132 | 100 | A further supply of 11.5 rounds per man is carried in the German service, and 10 rounds per man in the English service, in the company or battalion baggage wagons, but which may not be available on the battle field. |
| In divisional or first line of ammunition columns..... | 29.5 | 46.4 | 48 | 52 | 40 | |
| General total of supply for field of battle..... | 168 | 142.5 | 183 | 184 | 140 | |
| In army corps or second line of am. columns.... | 29.5 | 33 | 32 | 13 | 30 | |

This table is based on the battalions being at full strength, but we can readily see that if we deduct those absent from sickness, wounds, deaths, etc., and consider that the cartridges of the killed and wounded should be used, and that all the troops present do not generally engage in an action, with ordinary care and precaution, each man ought to have at his disposal from 120 to 150 rounds, and a further supply available at the end of the day.

In the European armies the company or battalion ammunition wagons follow the troops they are to supply to a sheltered position not far in rear of the line. Their position is indicated by means of a special flag placed to one side where it can be readily seen, and at the same time not draw the enemy's fire. At night a colored lantern takes the place of the flag. It is a ruling principle that troops engaged are to be supplied from any available wagon. If necessary, connection is kept up between the battalion and its wagons by means of mounted orderlies. In drawing ammunition no formal receipt is enacted. Before an action begins two or three men and a non-commissioned officer from each company report at the wagon, when they divest themselves of their equipments, and with bags and wallets provided for the purpose and kept with the wagon, they commence at the beginning of the firing to carry cartridges to their companies.

The German soldier carries 500 rounds, weighing 44 pounds. This is considered the limit of weight which one man can carry for any distance over rough ground. The French soldier carries 336 rounds (56 packets), weighing 37 pounds. After distributing the ammunition the carriers return to the wagons for a fresh supply. On the offensive it is very essential that each soldier be fully supplied with cartridges before the attack begins, "a sufficient supply for infantry is a necessity for its very existence." On the defensive, when positions can be selected beforehand, small depots of ammunition are established along the line. In such positions more cartridges can be given to the men, as they can lay it alongside them on the ground. When the necessary cover can be obtained, even wagons are posted along the line. In action the ammunition wagons will be, as a rule, within 900 to 1100 yards of the firing line. In the German service, if it is a necessity, the ammunition wagons of a regiment or brigade may be grouped together. In very urgent cases a wagon may be taken at full gallop up to the firing line. The battalion wagons replenish their supplies from the first échelon of the army corps ammunition column. The battalion adjutant is charged with seeing that the details of supply are properly performed. An empty wagon is sent at once to the nearest échelon of the ammunition column to exchange its empty boxes for full ones. This seems a very unnecessary waste of time. Why not order up at once a full wagon? However, the commander of the first échelon can at his discretion, but must if he receives an order,

send some of his wagons to the points where incessant fire indicates that ammunition is being rapidly consumed.

Empty wagons of the first échelon are sent in groups of four or five to the second échelon, where they remain temporarily, an equal number of full wagons of the second échelon taking their place.

In the French Army the battalion wagons are placed in charge of a chief artificer, who is mounted, and who has general superintendence of all the regimental wagons. The troops are supplied from the wagons only when the cartridges taken from the dead and wounded are used up. On the battle-field the battalion wagons are grouped regimentally, and as a rule do not accompany their respective battalions. The officer commanding the regiment or battalion designates the position to be occupied by the wagons.

The men receive extra packets of ammunition before joining the firing line, and advantage is taken of every pause and cessation of the enemy's fire to renew the supply. The sending of men from the front to the rear for ammunition is strictly forbidden. Men from the reserve companies are detailed to bring ammunition from the wagons to the firing line. When a battalion wagon is empty, word is sent to the nearest ammunition section, and a full wagon is brought up and its contents transferred to the empty battalion wagon, after which it returns to its original position. Such a transfer is unnecessary. The wagon should remain where it is until the action is ended. The first échelon of the army corps park follows 2000 yards in rear of the troops. The different sections follow as closely as possible the troops to which they are assigned. After an action the different sections are grouped together at some central point to carry out the general supply. The supply is made by transferring ammunition from the full to the empty wagons, an exchange of wagons being rarely allowed. It would be much more practicable to exchange wagons, and the drivers and teams if necessary. The second échelon follows a day's march in rear of the troops. During a fight it closes in on the first échelon, and constitutes a single "distribution centre" at which the empty wagons of the first échelon refill. The empty wagons of the second échelon refill at the nearest army park, the position of which has been previously designated.

In the Austro-Hungarian Army the following points are to

be noted. Before the beginning of an action 20 extra cartridges are issued to each soldier, making his supply 120 rounds. The confidence of the soldier is thus increased, and at the same time he is enabled to maintain an energetic fire from the beginning of the action.

The supports carry forward and distribute the ammunition required by the firing line. An objection to such a method is, that the supports do not always move up to the troops they are expected to supply, for the firing line is frequently reinforced and extended by moving the supports up on the flanks, or by introducing them into gaps in the line. When a soldier is once in the firing line it is exceedingly doubtful whether he would consent to give up any of his cartridges to a comrade. Rigid discipline and training inculcating the idea of mutual co-operation is the only remedy for the latter trouble. It is well to give the supports more cartridges than they can conveniently hold and at the same time use their rifles as a means to the above end. Such a method has certainly the great merit of not taking men from the firing line. The ammunition wagons are under the immediate control of the battalion or regimental commander. In the Russian Army when operating offensively the ammunition wagons join the engaged units if the ground permits. When compelled to remain in rear, they either join the reserve battalion of the regiment, or the companies which form the battalion reserve. If impracticable for the wagons to join the firing line, ammunition is replenished by making successive demands on the troops in the immediate rear, or on the wagons, if not too far distant.

The above method is to be used only when it is impossible to supply the engaged troops directly from the wagons. When a commanding officer needs ammunition he sends two or three men to the officers commanding units directly in his rear. These officers order their men to give up half their ammunition and detail a sufficient number of men to carry the ammunition forward to the troops who need it.

These men on reaching the fractions to be supplied, distribute the cartridges, and remain under the orders of the commanders of the fractions. In this way a too frequent coming and going between different units is prevented. Extra cartridges are distributed to the men who are first to be deployed, and are carried by them in their pockets. Empty wagons are

replenished by directing them on the second group of the regimental train, at whose head we find the eight wagons told off to the companies and the regimental reserve. Some German and Russian authorities recommend the assigning of two or more pack animals to each wagon, or, in any event, the harness should be constructed with a view to be used for pack purposes.

When there are no pack animals, the horses are to be taken from the shafts, and ammunition carried to a more advanced position than the wagons can attain. If a horse is killed, the man who leads it is to remain near by until another horse is brought up, or the cartridges removed. In the official work on "The Armed Strength of Russia" we read that to convey ammunition from the wagon to the firing line, "the cartridges are sent forward in bags secured to hooks on the harness of the outside horses, driven four abreast, which are thus temporarily used as pack animals."

The German authorities have apparently decided to act in a similar manner, for in the *Revue Militaire l'Etranger* we find that the "supply of ammunition to the firing line is no longer to be carried out by means of carriers. This method has been recognized as completely inefficacious, and the two leading draught horses of the battalion ammunition wagon will be employed instead. Each horse will carry two boxes of 1000 rounds each. These horses will only be taken as far as the supports of the firing line, who will carry forward the supply for the men firing."

It is evident that the European military powers employ similar means and ideas in regard to the supply of infantry ammunition.

The soldier's equipment should be divided into two independent parts—one carrying what is necessary for fighting, and from which he should never part; the other carrying the necessities for living, and which may, if necessary, be carried for him. Cartridges should not be carried in the blanket-bag. It is well known that soldiers will throw their blanket-bags away, and it happens that it is often necessary to leave them behind, in which case the soldier would have no defined means of taking care of the ammunition it contains. If the blanket-bag is retained as a receptacle, there still remains the serious difficulty of quickly getting at the ammunition it contains in time of need.

There are numerous devices to carry the needed ammunition, such as pouches, bags, haversacks, extra pockets in blouses and

trousers, etc. There will, however, always be an objection to any increase of articles comprising the soldier's equipment, and it will require constant watching to prevent the soldier throwing away such articles. I do not believe that there has been any better means of increasing the supply of ammunition at the beginning and replenishing it during the progress of a battle than has been devised by Captain Wilson. He recommends the packing of cartridges in a packet made of light cotton cloth, the packet to have loose ends that can be tied together, forming a kind of belt or loop, all ammunition to be put up in these packets instead of in paper cases, as is the present custom. The soldier receives his cartridges ready for instant use, and either swings his loop over his shoulder or ties it around his waist as a belt. When empty the packet is thrown away. Such a method does away with increase of accoutrement and makeshifts, and greatly facilitates the handling of cartridges. Captain Wilson, in writing of his device, says: "The advantages of the packet extend to all phases of cartridge-handling, but perhaps none would appreciate it more than the man who, when hotly engaged, should receive from the ammunition party one or more, which he at once slips over his head, and his cartridges are safe and more easily got at than if in the box or belt. Contrast his condition with the man, similarly situated, who should have two or three of the present paper cases of cartridges put into his hands.

"To supply more ammunition for battle and at the same time put a less quantity on the person of the soldier while on the march than is done in other countries may seem paradoxical. But I believe that to be the true policy. Celerity of movement is so potent a factor of success in war that our study should be how to sustain the minimum number of cartridges on the soldier, not the maximum. * * * I would stick to old traditions and fix the soldier's marching load at forty rounds." I do not see, as far as the cartridge service itself is concerned, that we can do better than to adopt some of the same means of distribution as are in vogue in the European armies. Whatever system of distributing ammunition may be adopted, it is absolutely necessary that it be practised in time of peace as a regular drill, until it becomes a habit as familiar as any other routine duty. The simplest system will require special training, and the great danger of running short of ammunition should be impressed on the men, and they should be carefully taught in every case to retain a small

reserve of ammunition to meet a sudden surprise or counter attack.

In submitting the above paper originality is not claimed, and I have but attempted to present what is in a large measure a compilation from the valuable work of such a well-known authority as Captain Mayne, R. E. The importance of the subject is considered sufficient justification for its frequent presentation and discussion.

A TRIP TO INDIA, CHINA AND JAPAN.

BY CAPTAIN S. M. MILLS, U. S. A.,

FIFTH ARTILLERY.

(Continued from JOURNAL No. 43.)

THE English artillery service is not organized into regiments, as in our Service, though it is called "Royal Regiment of Artillery," but is organized into brigades, and is composed of three brigades of horse artillery, six brigades of field artillery, five brigades of garrison artillery, and one brigade of coast artillery: Each brigade of horse artillery consists of a staff, ten batteries and one depot battery, the latter is attached permanently to headquarters—trains all recruits and supplies all drafts for the batteries of the brigade to which it belongs. The brigades of horse artillery are designated by the letters A, B, and C, the batteries are also designated by letters of the alphabet, the letters of the battery precede those of the brigade—thus E/A R. H. A. would indicate E battery, A brigade Royal Horse Artillery: The brigades of field artillery are designated by numbers, the batteries by letters. Thus, E/3 R. A. would indicate E battery 3d brigade. Each brigade consists of a staff, fourteen batteries and one depot battery.

The brigades are commanded by colonels or lieutenant colonels, and the batteries by majors. The garrison artillery brigades are designated by numbers, as are also the batteries, but the brigades have in addition a territorial designation, thus 5/1, Scottish or London, etc., divisions.

These batteries of artillery are scattered all over the world, and wherever serving, in the colonies or in India, are under the command of the senior artillery officer in the district where they may be doing duty. This senior artillery officer is attached to the staff of the general commanding the district and in all matters purely of a technical character he communicates direct with the Assistant Adjutant-General Royal Artillery on the staff of the General Commanding in India; in matters of discipline, or ordi-

nary routine matters of general import or of defense, he communicates with the general commanding the district.

The headquarters of the brigades with the depot batteries are permanently located at stations within the kingdom. The garrison batteries are distributed to the fortifications at home and abroad, and some of these batteries in India are equipped as elephant or 40 pdr. batteries. We had one such in the Southern Army during the manœuvres.

I cannot, however, pursue this subject further in this direction without encroaching on my official report, but I can remark, though, that the utmost enthusiasm prevails throughout the artillery for the mounted service, and particularly for the horse artillery. I did not meet or know an officer of the rank proper, who was not wholly intent upon promotion or assignment to a horse battery, and saw none but who would regard it as a misfortune to have to go to a garrison or sea-coast battery. It is quite possible in an artillery organization such as the English have to keep the two different classes of officers separate for these two distinctly different class of duties, which require for their successful prosecution talents and qualifications entirely different. In our Service, with a regimental organization, though the same different class of duties exist, it is not practicable to keep the details distinct. I think it would be much better to meet the demands of modern service to organize and officer some of the regiments entirely as garrison or sea-coast regiments, and others as field artillery regiments.

I venture the statement that there is no artillery service in the world where the officers are detailed by *roster* for the higher course of studies as pursued at our Artillery School. In other services this higher course of artillery is elective, and only taken by those who possess the necessary mathematical and other qualifications and taste for that branch of the Service; with us all must take the higher course as well as the field artillery course, though in many instances much time is wasted, the officers not possessing the qualification.

In matters of drill there is very little difference between the English and our own tactics. In the English drill they require No. 1, who is a sergeant (with us the chief of section), to perform all the duties that we require of the gunner (a corporal), leaving him no time to supervise the other gunners, and yet he is responsible for the whole. I think ours is much better in that respect.

The movements of "changing front," which were purposely omitted in our tactics of 1874, for the reason that they found no application in war, were constantly being used during the manoeuvres, even changing front forward on an interior gun by throwing forward one flank and retiring the other. The caissons were, however, some distance to the rear under cover during these "changes of front," so that the movement was not as complicated as it used to be with us when the caissons were present.

I noticed a pleasing feature I think worthy of adoption—A battery passing in review; at the command "guide right," given by the commander of the battery as he approaches the reviewing officer, the *drivers* and *cannoneers*—the latter mounted upon the ammunition boxes with arms folded same as with us—*turn their heads to the right*, the drivers at same time extend their right arms with whip pointing over the neck or collar of the off horse, after passing a few yards, resume their former positions.

The following is an outline of the artillery administration in India :

INSPECTOR-GENERAL OF ARTILLERY IN INDIA.

- 1 Major-General (local rank) Inspector-General.
- 1 Colonel Deputy, Adjutant-General Royal Artillery.
- 1 Major Deputy, Assistant Adjutant-General Royal Artillery.

The Inspector-General makes periodical inspections of the artillery throughout India, including all forts, under such instructions as he may from time to time receive from the Commander-in-Chief in India.

There is attached to each division and brigade staff throughout India, as before mentioned, a field officer of artillery who commands the artillery in that division or district. He makes two inspections each year, including arsenals, magazines, ordnance depots, and all ordnance mounted in forts situated within his jurisdiction; he has no authority over officers detailed in the ordnance department, and his duty is confined to reporting any deficiencies for the information of the Commander-in-Chief.

ORDNANCE DEPARTMENT.

All officers of this department are detailed from the artillery for a period of five years; details can be renewed.

DIRECTOR-GENERAL OF ORDNANCE.

- 1 Major-General—Director-General.
- 1 Field officer—Deputy Director-General.
- 1 Captain—Assistant to Director-General.

INSPECTOR-GENERAL OF ORDNANCE.

- 2 Major-Generals.
- 1 Field officer.
- 1 Field officer—Deputy Inspector-General of Ordnance.
- 1 Field officer—Assistant to Inspector-General of Ordnance.

Then follows four different classes of commissaries of ordnance, comprising fifteen officers with the rank of captain or lieutenant :

ORDNANCE MANUFACTURING ESTABLISHMENTS.

- Superintendents of Factories—10 Field officers and captains.
- Assistant Superintendents of Factories—6 Field officers and subalterns.

It will be observed that in India for an army of 200,000 men, about 39 officers are employed in duties pertaining to the ordnance department, which department performs about the same duties as our own, whereas in our Army of twenty-five thousand men, about 52 officers are employed upon ordnance duties.

It was for a time quite the fashion in my own branch of the Service, and sometimes by the Press, to find fault for the various shortcomings or supposed shortcomings of the ordnance department, without considering the difficulties under which that department often labors, being restricted frequently by the very language of the appropriation to a course quite opposite to the best judgment of the corps. I believe that many officers of that corps are as able and as usefully employed as officers similarly engaged in any service of the world, and I believe also that there is a necessity in our Service, as it exists in other services, for a certain number of officers to be employed specially in the technical work of gun construction and upon other questions pertaining to the science of artillery; they should be men of the very highest scientific attainments, a few of them only being permanent and of the higher grade; the rest should be officers detailed with increased rank, if necessary, from any branch of the Service where genius or aptitude could be found; details to be renewed or continued where officers were engaged in special investigations or were experts. The number of officers thus employed to be regulated by the character and necessity of the work being performed at the time. I think the permanent part of our ordnance corps is too large.

The Staff.—There is no such thing as a permanent staff in the English Army or in India, nor is there in any modern army

of the world, *except in the higher grades*, save our own, if we call ours a modern army. The French being the last to give it up.

In India all staff duties are performed by officers detailed from regiments or corps and for a period of five years; the details can be renewed when the officers' attainments are conspicuous. These details are nearly equally divided between the officers serving with British and native troops. When detailed from regiments, the officer after a specified period, usually a year, is seconded in his regiment; that means that an officer is assigned to his vacancy in the regiment, but he is still borne on the rolls, and on rejoining after his detail has expired takes his former position, unless in the meantime he has been promoted. If there be no vacancy he takes the first that occurs, and until then is carried on the supernumerary list.

STAFF DEPARTMENTS.

| | |
|--|--|
| Army Staff. (Detail for 5 years.) | { Adjutant-General—Quartermaster-General. Brigade Major (Adjt.-Genl. of Brigade). Staff at stations and staff for Army Corps, Di- visions and Brigades. |
| Personal Staff. (Detail for 5 years.) | { Military Secretary and Aides-de-Camp. |
| Departmental Staff Corps. (Permanent assignment.) | { Commissariat (supply). Pay and Medical Transport. Branch of Commissariat (detail for five years). |

The Adjutant-General for India has the local rank of a major-general during the period of his appointment, and his department has to do with all questions or subjects connected with the discipline of the command, arms, ammunition, pay, commissariat, clothing, confidential reports, and generally with the training and efficiency of the army, and upon questions relating to appointments in native regiments. The present adjutant-general, Sir Thomas Baker, K. C. B., A. D. C., is a lieutenant-colonel.

The Quartermaster-General has the local rank of major-general, and holds his office for the same period (five years) as the adjutant-general. The present quartermaster-general is E. F. Chapman, C. B., A. D. C., Major Royal Artillery; his duties and those of the officers detailed in his department are very varied. Under the orders of the Commander-in-Chief he is entrusted with the duty of quartering, encamping, embarking, disembarking and moving troops; knowledge of the roads, and features of all portions of the country applicable for defense; the course of rivers

and power of inundation; in coast districts, possesses accurate information of practical points of landing, and the best position for defense in their immediate vicinity; the construction of rifle ranges, practice and exercising grounds for the different arms of the Service, cricket grounds, and gymnasias, workshops, theatres, soldiers' gardens and recreation rooms; the employment of troops whether by paid or fatigue labor on public works or military defenses; cantonment lands and boundaries, cantonment rules; and funds, forage, bazaars, grants of land and building advances; water supply, sanitary conservancy arrangements; military surveys and reconnoissances, bridges and pontoons; journals of the movements and operations of armies in the field; military science, geography, topography, intelligence, army signalling and telegraphy; also maps, plans and dispositions for defense.

This department, which is similar in name to our own of the same designation, has many duties besides, and commands the best talent in the army. It is divided into various bureaus or branches, presided over by a selected officer. We will take the *Intelligence Bureau*, which is one of the branches of this department in the English Service generally as well as in India, where there are four officers engaged in the special work; one of these, Captain Maitland of the Poona Horse, is with the Russian and English Boundary Commission in Afghanistan. Its organization in India is similar to that in England, but on a smaller scale; it is the only part of the staff in the English Army that has apparently a fixed organization. There is a lieutenant-colonel of Royal Engineers at the head of this branch in India. The officers engaged in this work do not talk much of what they are doing, the character of which work is confidential. I assume we all know the scope and methods employed by this branch of the Service in modern armies, so I will not occupy time in describing it.

The Naval Intelligence Bureau of our own Service reflects immense credit upon those that organized it and have since brought it to its present state of usefulness.

There is hardly a department of the Government that has not had occasion to acknowledge its benefits; and why we are so long in organizing a similar branch in the Adjutant-General's Department is hard to understand. I don't suppose there is an available assistant adjutant-general that would care to take up

the work, but surely there are plenty of officers that could soon qualify themselves for work in that branch of the Service.

Another of the subdivisions of this Quartermaster-General's Department is *Army Signalling*; there is probably no army of the world that gives more attention or more fully appreciates the many advantages of this instruction than the British Army in India.

This is the home of the heliograph and heliostat. As we are frequently threatened with a "permanent Staff Corps" whose duty would be to supply our little Army with this instruction, let us see how this Indian army of 200,000 men manage it. There are four places where officers are instructed in signalling, three in India, viz.: Bangalore, Poona and Meerut and at Chatham in England. The instructors at these central schools are officers detailed for the usual period, and frequently engineer officers, as any officer from that branch of the service generally has charge of army signalling in the quartermaster general's department. Classes consisting of six officers and from twelve to eighteen non-commissioned officers and men are from time to time formed at these central schools of instruction for a *six weeks' course*. The officers and men are selected from different organizations upon the recommendation of the commandants. After passing the qualifying examination they receive certificates as instructors for their regiments. The names of those qualifying are published in general orders. These officers and men return to their regiments as instructors; classes are formed and a certain number in each company receive instruction. One officer from each troop or company and twelve non-commissioned officers or privates from each regiment of cavalry, and sixteen non-commissioned officers or privates from each battalion (eight companies) are specially selected as the regimental or battalion signallers; and three supernumeraries per troop or company are trained to replace men becoming ineffective. The regimental signallers are inspected annually by the assistant quartermaster general of the command, and report sent to army headquarters.

The officer instructor of each command is appointed annually by the commanding officer. When the command takes the field the signal parties are organized from the regimental signallers, under an officer attached to the headquarters staff. The men are armed with the sword-bayonet and a short carbine slung

over their backs. Three men form a complete party provided with their outfit.

Selected men are instructed in telegraphy at the station telegraph office, and when a sufficient number have qualified, telegraph stations are established in public military staff offices for further practice; a soldier signaller receiving a fee of 12 cents for each message sent and received correctly up to a maximum of \$12.00 per month. Soldiers who excel and pass the examination may enter the telegraph department permanently and be transferred to the unattached list.

This is an outline of the method of instruction in signalling pursued by an army prepared to take the field at any time, and does not require a "permanent staff corps."

Let us note a few more facts about staff service, etc., in India.

Since the transfer of the government of India from the East India Company to the Crown, all officers for service with the native troops now come through the British Army proper upon voluntary application after passing a prescribed examination, and recommendations from commanding officers; after one year's service on probation with native troops, during which period they must pass another examination which includes among other subjects the higher standard in Hindustani; they are finally transferred and do not return again to service with British troops. Their promotion then is regulated as follows, their service counting from date of first permanent commission: viz., officers of eleven years' service, four of which since their transfer will become captains; after twenty years' service, six of which since transfer, shall become majors; after twenty-six years' service, eight of which since transfer, will become lieutenant-colonels. Five years' service as substantive lieutenant-colonel will entitle the officer so employed to the brevet rank of colonel. Colonels can rise to the rank of major-general (there is no rank of brigadier), lieutenant-general on the fixed establishment of general officers of the Indian army.

These officers, after transfer, are eligible with officers of British regiments for staff details and other duties (being seconded in their regiments); and for certain duties in India have advantages which the others do not have.

No officer can be detailed or appointed to the adjutant or quartermaster-general's department, or as brigade-major, who

shall not have passed the final examination of the Staff College (Sandhurst), except the officers of Royal Engineers, under certain conditions, and officers of proved ability on the staff in the field.

No officer can be detailed as an aide-de-camp to a general officer in India without first passing the prescribed examination; and as a first condition in all these details the officer must have the favorable recommendations of his battery, troop or company commander and other commanding officers.

These facts, with what I have said before, give us an idea of the staff service as it exists in India and in the English Army.

Now any one who investigates the subject of staff organization and service as found in modern armies will find that we are in our Service totally at variance with all modern ideas on this subject.

To begin with, we have no military staff in the sense that it is known in other armies. Military writers and commentators of recent times, dwelling upon the importance and well-known necessity of a highly trained and educated staff, have in mind a very different organization and system from what we, having inherited, still cling to.

How are we fulfilling that essential requirement which demands that in time of peace the Army should be used as a training school to prepare officers for their special duties, including staff duty, and for higher command?

Instead of educating and giving experience every year to a number of officers of different grades possessing the necessary aptitude in the various duties of the Army staff at the higher and supreme headquarters, and sending them back at the expiration of their details to their duties, commanding troops, service with regiment and other staff work (for I would open these details to engineer and ordnance officers if they possessed the taste and fitness, and further requiring that they should serve a detail with troops). What do we do? Why we confine the experience and knowledge gained in a lifetime of service to a comparatively few officers, and prevent them from ever coming in contact with the Army except as they see it on paper; their positions permanent and assured, with no responsibility, no examinations, no incentive or ambition other than that found with all officers to do the duty required of them; every daily official act of their lives has to do with a soldier which many of them have

had no practical knowledge in commanding, or at least not for many years; and this is the military staff from which we might hope, if organized as it should be, to find as in other services men trained and experienced in all branches of the Service, and fitted for the highest command.

If its organization contemplated or required the selection of men of approved professional attainments and fitness, with periodical service with troops and examination before promotion, this would be something in the direction of modern ideas, but it does not, though perhaps many of those now in those departments possess all these qualities.

I wish to state, however, that in giving out these ideas I have in mind only the organization and system as we find it, and not of the personnel as it exists, the members of which are in all probability as able and as efficient as the system requires, or as it is possible to get under the law, but I wish to state emphatically that a permanent, fixed military or army staff, as it exists with us to-day, is an anachronism in these days, and is opposed to all modern military systems, where a constant interchange of duties with the line in the lower grades is kept up; the officer finally selected and transferred to the fixed establishment in the German Army has passed through all the examination tests, has gained experience in serving with all branches of the Service and in minor staff duty for a number of years, has become a master and teacher of the science; but in order that he may still preserve the *habit of command and knowledge of troops* he must return periodically and before each promotion to the line of the army, and exercise command for a year corresponding to his rank.

Who is prepared to say that every assistant adjutant and inspector-general in our Army—I speak of those in the lower grades and who have been longest away from troops—would not be more competent to fill their positions if required periodically to command troops and posts.

LIGHT ARTILLERY TARGET PRACTICE.

By LIEUT. H. L. HAWTHORNE, U. S. A.,

SECOND ARTILLERY.

"The service which artillery can render in action depends upon its skill in shooting at movable as well as fixed targets."—DRILL REGULATIONS FOR LIGHT ARTILLERY, U. S. ARMY.

THE first and most important step in the new departure should be the adoption of a thorough system for conducting target practice; and second, a complete code of firing regulations.

In this paper, the first heading shall be made to include the training of the soldier to hit the target; the second, the training of the officers to hit the target under any circumstances, with the least delay after opening fire, and after that, with the greatest effect; no attempt will be made to do more than outline a system, which, though modest, may be considered an improvement, at least on the crudities of the past.

I. TARGET PRACTICE.

1. ELEMENTARY INSTRUCTION.

- a. Theoretical instruction in gunnery.
- b. Principles of graduating sights.
- c. Principles of pointing guns.
- d. Causes affecting projectiles.
- e. Rules for percussion and shrapnel fire.

2. PRELIMINARY INSTRUCTION.

- a. Laying and pointing.

3. KNOWN DISTANCE FIRING—FIXED TARGET.

- a. Fire with percussion shell.
- b. Method of correction after each fire.
- c. Number of hits and value of fire.
- d. Fire with shrapnel—time fuse.
- e. Effect on target—how judged.

4. KNOWN DISTANCE FIRING—MOVING TARGET.

It might be objected that the theoretical instruction does not properly come under the subject of target practice, but to make

this instruction certain, it would be wise to include it in the prescribed course of practice. This instruction may be conducted practically by means of a rifle barrel mounted on the gun carriage, with canvas screens placed at distances proportionate to the size of the powder charge.

Non-commissioned officers should be thoroughly grounded in these principles, at the same time the relative merits of the cannoneers would be shown. About one month should be given to this work.

In the known distance firing, we should make up our minds to abandon the old method of gathering information from observers and making corrections blindly at the gun, from facts telegraphed to the firing station.

This procedure discourages the use of the eyes and judgment and leaves the gunner helplessly waiting on reports to come from the target. The development of keenness of vision and closeness of estimation of distances and carefulness of judgment should begin in this practice. The gunner thus enters the practice at unknown ranges with a good groundwork for obtaining, in the least time, the greatest advantage from his trial shots. He learns to judge the relation between the limits of the area of dispersion of the shots and the divisions on his sight, for he can give his undivided attention to this, untroubled by the range which is known at the start. His eye is further trained to the adoption of a unit of height for the explosion of shrapnel, which he learns soon for different ranges by the effect on the targets.

The number of hits on the target, alone, should be relied on as a measure of the accuracy of fire and in the use of shrapnel, the rules which insure the most severe effect of the cone of dispersion can be practically demonstrated.

Thus the soldier, from day to day, becomes more familiar with the unit of measure which he may adopt, and will know soon, intuitively, if he be firing effectively, or if not, what corrections are necessary.

The targets used for shell-fire should be of wood, about 12 yards long and 6 feet high, to represent an infantry subdivision of attack; the same for cavalry, but 9 feet high. The artillery target should be made in small sections, each to represent the front of a gun and cannoneers and separated from each other by the prescribed interval. The depth of the targets should be

marked off by stakes and the ground smoothed, in order that the impingement of the shots may be seen. The infantry *silhouettes* should be used for skirmisher targets, while earth-works should be thrown up for the purpose of studying the effects of projectiles against various materials and thicknesses of parapets and revetments.

For shrapnel-fire, the wooden targets should be arranged in column, about 20 yards apart. This distance could be varied in order to discover the most effective shrapnel-fire against batteries in action.

In this practice, moving targets should be used for the purpose of educating the gunner's eye in the proper estimate of the speed of the different arms at various distances. The target should be made to start from a point whose range is known, at a pre-arranged moment and over a measured course. Before opening fire, the target should pass over the field many times, at the average rates taken by the different arms, to enable the gunner to fix in his mind a unit for future estimates.

He should also learn the approximate time occupied by the projectile in passing over the various known ranges and be expected to so lay the gun that, at a given signal, the target should be seen in such a position that, had the gun been fired, the projectile would have hit the target.

There should be no hurry or scramble about this practice, as nothing could destroy more surely the interest of officers and men, and what is worse, leave the gunners totally unfit to enter on the next and more advanced stage.

It is not expected that much instruction could be had beyond this with the small supply of ammunition appropriated for the light batteries, but the hope may be entertained that each gun will be supplied with 200 rounds per annum.

Known-range firing should continue for at least two months, preferably selecting days with varying conditions of wind and sunshine.

This firing should be devoted solely to the training of the gunners and of those who would naturally take their places should any or all of them be disabled. They would thus be prepared to carry out skillfully the manipulation of the guns as fighting machines, under the control of the officers directing the fire.

II. FIRING REGULATIONS.

I. UNKNOWN-DISTANCE FIRE.—FIXED TARGET.

a. Use of range-finder.

b. Fire with percussion shell : { 1st. Establishment of the area of dispersion.
2d. Rules for corrections : elevation and deviation.

2. UNKNOWN-DISTANCE FIRE.—MOVING TARGET.

a. With percussion. Object moving towards, from, or in a diagonal direction to the front of the battery.

b. With shrapnel.

3. EXCEPTIONAL CIRCUMSTANCES.

a. Smoke.

b. Masked enemy.

c. Short ranges.

d. Long ranges.

If what is said of the range-finder be true—that a range can be determined by it in thirty seconds—it will prove a valuable addition to the outfit of a light battery. It will make, undoubtedly, a large saving in ammunition, used in establishing the area of dispersion, besides allowing a sudden and effective change of target during the firing. The area of dispersion could be made very near its minimum at the start, and its usefulness would be particularly important for fire on moving targets.

The range-finder detail should be permanent in the battery, and should be under the direct control of the captain of the battery.

In the firing rules of foreign services, a certain area of ground about the target is taken as a measure of the accuracy of fire. By some, this is called the "fork," and by others, the "zone of fire." As the term "fork" is somewhat meaningless, and the word "zone" is used to indicate the divisions of the field of fire with reference to the effect of various projectiles, the expression "area of dispersion" has been taken in this paper as an equivalent, but less ambiguous term.

The area of dispersion is usually established in the following manner: "The distance is estimated and fire commences against a certain point of the object. If the first shot falls short, the next one will be fired with more elevation (depending on the distance). This is to be continued until the object is enclosed by one shot striking in front and one in rear of it. If the first shot falls in rear of the object, the elevation is reduced to such extent that the next shot will strike with certainty in front of the

object. The fork established in this way will be reduced by diminution, up to 50 metres."

"The amount of deviation is estimated from the centre of the object. Correction will be made immediately, if the first shot exceed $\frac{1}{16}^{\circ}$ (one mark — $\frac{1}{1000}$ of the range). If the deviation be small, correction is made on a basis of several shots and the average deviation taken. Corrections below $\frac{1}{16}^{\circ}$ are not necessary."

GERMAN FIRING REGULATIONS, 1889.

An area of dispersion is established, whose limits should be four times the probable error in range and twice the probable error in deviation. For mid ranges up to about 2500 yards, these errors of the 3."2 rifle are about 15 and 1.25 yards, respectively. For ranges beyond this, these errors average about 35 and 3 yards. If, therefore, a certain proportion of shots fall within an area of dispersion, 60 by 2.5 yards for mid ranges and 140 by 6 yards for long ranges, the firing may be considered satisfactory. It then remains to determine what proportion of shots should fall short of or over the target, in the determination of the correct range and what error in deviation would justify a side correction; and further, what influence the depth of the target would have on this proportion.

The rules for determining this are various in the different foreign armies, therefore such rules should be subjected to careful trial before selection and adoption. To illustrate:

In France, $\frac{1}{2}$ to $\frac{2}{3}$ of the shots should fall short on a narrow target; $\frac{3}{4}$ to $\frac{2}{3}$ of the shots should fall short on a deep target.

In Germany, $\frac{1}{2}$ to $\frac{2}{3}$ of the shots should fall short generally; that is, if $\frac{2}{3}$ strike in front of the object, the range is too short; if less than $\frac{1}{2}$ strike short, the range is considered too long. If the error in deviation be greater than double the probable error, side correction should be made, but not greater than $\frac{1}{2}$ of a division for mid, and 1 division for long ranges on the deviation scale. If the wind be very unfavorable, correction should be ordered at once for all the guns.

After the area of dispersion is established, all the sights should be placed at the shortest limit. Correction should not be made until after six shots, which have been well observed, have been fired; but should the three first shots fired with equal elevation

show the same variation, a correction should be made at once. But if by increasing the elevation by the limits of the area of dispersion in range, the three first shots fall short, or if decreased too far, it is necessary to establish a new area of dispersion. Pieces which continuously fire short or too far, should be rectified by their chiefs of platoons under the rules laid down for finding the area of dispersion.

Should the shells not be provided with combination fuses, then shrapnel fire, as a rule, begins after the establishment of the area of dispersion with percussion shell. For the successful use of shrapnel, it is essential that the time fuses be of reliable quality, or if this be not certain, then the variability should be approximately known from trial.

The proper point for bursting is placed by artillerists at various distances in front and above the target, therefore it would be well to establish rules for this fire from our own experience with the new guns. Starting with the generally accepted principles that the lower nap of the cone of dispersion is the most effective, and that high bursts cause a great loss in the velocity of the bullets, we may, by experiment on different depths of targets, find the points of most effective bursts for the various ranges. With the elevation of the shortest percussion shots, the fuse should be cut for bursting short of this range by the distance in front where the most effective bursts should occur. If, then, these bursts are seen to be too high or too low, decrease or increase the elevation by half the limits of the area of dispersion, without disturbing the time of the fuse. This rule becomes the more simple by the equal weights of shell and shrapnel with which the 3".2 gun is provided.

To establish the area of dispersion by the use of shrapnel alone, having the time fuse, larger limits are necessary than when using percussion. If the shots strike continuously short without exploding, the range is too short and the fuse too long. By making the necessary corrections, but in changes of, say 100 yards at a time, the points of explosion may be quickly found. In loading for this purpose, the captain should command the loading of the right or left piece only and direct the other pieces to load in succession, keeping the shrapnel in readiness to make any changes he may deem proper. In the use of the shrapnel with combination fuses, this complication is unnecessary.

MOVING TARGET.

In case the line over which the target is advancing be in plain view and have numerous prominently marked points, the range finder could be used to report ranges as before, but this would require very rapid work. It would be well to use percussion shell for this class of fire, unless shrapnel fire has been directed against a stationary target which begins to move, or if the battery be firing shrapnel and is attacked by cavalry.

In case the target be approaching the battery, the general rule should be to establish a large area of dispersion, continue slowly to fire, using the shortest limit, until one shot strikes beyond the target; then reduce the elevation sufficiently to insure the shots striking in front of target and resume the slow fire. The fire should increase in rapidity as the target approaches the battery. When the target is moving away from the battery, the rule for fire should be the inverse of the above.

In the use of shrapnel under these circumstances, the only difference should be to use a rapid fire as soon as effects are noticed.

The fire at targets moving in diagonal directions to the front of the battery should be aimed at the head of the object and the gunner directed to follow its movements with a slow fire.

EXCEPTIONAL CIRCUMSTANCES.

If the target be hidden by smoke so that it is difficult to observe the explosions of the shells, salvoes should be fired to determine the range, then use shrapnel with the proper length of fuse for that range. The rules for fire should also prescribe the necessary correction, when fire is directed at objects above or below the battery.

Against sheltered or masked objects, curved fire should be used, care being taken to correct for the additional drift and the increased influence of the wind. It would be well to have a scale for the reduced charge determined upon. The general rule should be to use the longer range of the area of dispersion and to have a large proportion of the shots pass beyond the target.

In short ranges, the great difficulty to be met is the cutting of the fuse, to avoid having the points of explosion beyond the target. In this fire the study of the effects of canister should be carefully made, so as to be able to open in time to avoid the

mille. When the range is effective, the fire should be rapid, preferably by platoons.

For long distances, shrapnel should be used, for obvious reasons, taking care not to have the points of explosion too low. Correction in deviation should be made quickly, remembering that a much larger one is necessary than at short ranges, under the same meteorological conditions.

The modern system has been thoroughly established in foreign armies for many years and these suggestions are founded almost entirely on the methods now in use among them.

The aim which firing regulations should have in view is simplicity, with a large certainty of success in their application ; and the care of the battery commander should be the thorough comprehension of them by his officers and men. The groundwork of recitations should be carefully laid, to secure a perfect familiarity with the rules, which no situation could disturb or demoralize.

In the Book of Estimates for the Army appears the much-needed purchase of ammunition for the new field-gun. Under this appropriation can be purchased 2000 steel shell or shrapnel, giving on the average about 33 rounds per gun. Compared with the supply allowed foreign field-guns, this may appear rather limited, but if good use be made of these few shots, much advance can be made in our knowledge of target practice and much interest roused among our officers and men. However, this seems sadly out of proportion to the \$39,000 allowed for experiments with one 12-inch cast-steel gun and to the \$28,000 appropriated for similar work on one 10-inch gun.

THE RECENT JAPANESE MANOEUVRES.

By BVT. BRIG.-GEN. HENRY L. ABBOT, U. S. A.,

CORPS OF ENGINEERS.

IT is now fifteen years since a commission consisting of Generals Upton and Forsyth and Major Sanger, visited Japan on a military tour of inspection. The Revolution of 1868 had placed the Mikado in full control of the government. In 1872, upon his application, the Emperor of France had sent a commission of French officers, consisting of 1 lieut.-col. commandant, 2 captains of engineers, 2 captains and 1 lieut. of artillery, 2 captains and 1 lieut. of infantry, and 17 non-commissioned officers of all arms, to organize and instruct the new army, and establish military institutions upon a modern European basis. In 1875, the date of General Upton's visit, a military academy modelled after our West Point school, having annual classes of about 150 students, with a three-year course for engineers, artillery and cavalry, and a two-year course for infantry graduates; a school for non-commissioned officers; a school for musketry and gymnastics; a veterinary school; and a school for practical engineering had been established. Also an arsenal at Yedo, a foundry at Oji, a depot for remounts near Yedo, and a polygon, or artillery school of practice.

The Japanese Army in 1875 consisted of 1 general, 3 major-generals, 12 brigadier-generals, and 16 three-battalion regiments of infantry, 3 battalions of cavalry, 10 two-battery battalions of light artillery, 9 companies of coast artillery, and 17 companies of engineers, the whole aggregating, on a peace footing, 34,768 soldiers; and, on a war footing, 49,378 soldiers. The population of Japan in 1874 was 33,008,430, giving for the peace establishment about 1 soldier to 1000 inhabitants.

General Upton wrote: "The sudden transition of Japan from ancient to modern civilization, which will ever be the marvel of history, is nowhere more conspicuous than in the army. Appreciating the necessity of substituting a native force in the place of the undisciplined hordes, voluntarily furnished by the clans

under the old *régime*, the government applied for assistance to a nation renowned for the success of its arms. In response to its appeal, officers of distinguished reputation, responsible to their Secretary of War, and not adventurers, were designated for the mission. The zeal, the intelligence, the enterprise, and the success of the French officers were no less surprising than the wisdom of the government in supporting them, without jealousy, in all measures of reform."

The fruits of this wise military system were exhibited to the world in March and April, 1890 in a series of military and naval manœuvres ending with a grand review of troops, to which the foreign ministers and military attachés were officially invited for the first time in the history of the country. Japan has thus boldly challenged criticism, and has received well-deserved praise for her young army and navy, modelled upon European systems of discipline and construction. It is to be hoped that the time has come for the abrogation of certain old treaties based upon the mistaken idea that Japan is still a half civilized nation—and with which she has long been dissatisfied.

The recent manœuvres covered four days, and were had near Nagoya, a large city on the eastern coast of Japan, about 235 miles south from Tokio, the capital. They were conducted on a large scale, as if in actual war, the general outline only being pre-arranged. A powerful fleet of hostile war ships was supposed to dominate the sea, and an army of invasion had been disembarked, and had established itself near Nagoya. The whole coast from Hakodate on the north to Nagasaki on the south was assumed to be menaced from the water.

The Japanese Army had completed its mobilization and the fleet was concentrated in certain protected harbors occupied by the commercial marine under cover of harbor defenses.

The first day was devoted to a sham naval battle. The home fleet was composed of six modern war ships built and armed in Europe; and the attacking fleet of nine similar vessels, among which was the *Nariwa*, the prototype of our own *Charleston*. The operations were regarded by a distinguished English naval officer as highly creditable, both to ships and crews.

The land forces aggregated 28,000 troops of all arms, and for three days carried out a well-devised series of military operations. Advantage was taken of the extensive rice plantations which form an important element in the military features of the coast,

being extremely difficult of passage. In personal bearing, in their soldierly appearance, and in their movements the rank and file won great praise from competent authority.

Although the foreign military instructors still remaining in Japan are mostly German, the dress and equipments of the troops are still strongly marked by the earlier French influence. The infantry are armed with a breech-loading rifle of native design, closely resembling the Martini-Henry, and provided with a sword-bayonet worn as a side-arm whether on or off duty. Black powder was used at the manœuvres, but it is claimed that the Government is in possession of a smokeless variety, the secret of which is carefully preserved. The field batteries were all of late patterns of breech-loading and of rapid-firing guns, and were served with admirable rapidity and precision. The cavalry were mounted on diminutive native horses, and appeared to less advantage on this account, but progress is already making in improving the breed by judicious crossing with imported stallions.

Considered as a whole the manœuvres and display of forces, land and naval, were most creditable, and must have been very satisfactory to the Emperor and his Cabinet, who were all upon the ground.

MERITORIOUS DISCHARGED SOLDIERS.

BY J. E. BLOOM, ESQ.,

LATE LIEUT. FOURTH ARTILLERY.

WHILE visiting London in 1882 my attention was attracted by the neat, soldierly-looking uniformed class of men stationed at the most prominent hotels, theatres, etc., and whose services could be obtained at a small and regular charge. Upon investigation I ascertained they were members of "The Corps of Commissionaires," at that time numbering over 1000 members, concerning whom the following brief description may prove of interest :

The Corps of Commissionaires of London, England, is composed of honorably discharged soldiers and sailors (Regular and Volunteer), and has for its main object the obtaining of temporary and permanent employment for its members ; it was founded in 1859 by Capt. Edward Walter, to whose efforts the success of the same is doubtless due. Some of the most prominent officers of Great Britain are now upon its board of governors.

The Corps has a perfect military organization ; in addition it has a sick fund, an insurance fund, and a savings association. Besides having a principal headquarters with a barracks and mess hall in London, it has branches in Liverpool and other large cities.

It has a large endowment fund contributed by the public and by the army and navy, both officers and men, numerous regiments and many of the nobility contributing an annual sum towards the expense of administration.

All the members of the Corps contribute a fixed weekly small amount towards the joint administrative cost thereof, and thus a sense of independence and ownership, and the manly pride consequent thereon, is engendered in the men.

The actual work of administration is done by a salaried non-commissioned staff, under the guidance of an unsalaried board of officers and two or three retired salaried officers.

Active members are enrolled in accordance with their partic-

ular trades, such as common laborers, clerks, porters, mechanics, blacksmiths, carpenters, etc., when not employed in such capacities with permanent employment; they also serve as general commissionaires, messengers, policemen, escorts, nurses, couriers, guides, ticket-takers at theatres, also taking charge of furnished or unfurnished houses; and acting as escorts or guides about the city (a service which would afford work for a large corps during the coming Exposition at Chicago alone, irrespective of the large and permanent field existing in New York to-day).

Commissionaires whose bodily health, either from wounds or other causes, unfit them for ordinary labor, are provided with light work. It is thus manifest that the function of this Corps is not to supply mere messengers only; it goes much farther than this; both permanent as well as temporary employment is secured.

A very small percentage of the wages is paid into the administration and sick fund. Board and lodging for unmarried members is obtained at low rates.

The Corps guarantees the responsibility of its members, the privates at \$50, corporals \$75, sergeants \$100. Men who are old or helpless are not admitted.

The Corps has proved itself of great value to employers, who send to the headquarters for such temporary and permanent employés as they may need. Upon request, men are sent "on trial": if satisfactory, a small fee is paid.

In a future article I will endeavor to describe the details of the organization and administration—this being intended merely to suggest the subject for consideration in connection with its proposed adaptation in this country.

In the United States a special effort is being made at present to better the condition of the enlisted man, and thereby to induce a worthy class of young men to enlist in the Regular Army. Would not this effort be materially assisted if a similar Corps of Commissionaires were provided in which honorably discharged soldiers would be received and provided forthwith with a means of gaining a livelihood in civil life? The mere question should at once clinch the argument in favor of the proposition.

In this country this system is well adapted to a corps composed of honorably discharged men from the United States Regular Army, Navy, Marine Corps, and veterans of the late War,

both Union and Confederate, all of whom would be required to hold honorable discharges and recommendations; it might also be opened to the National Guardsman of ten years' service.

After a headquarters organization is established in New York, branches would speedily spring up in other cities under the guidance of resident officers.

It would be accomplishing something very material for the benefit of the private soldier.

It would be judicious to have the Corps incorporated in New York State or by Act of Congress by a few prominent Regular Army and Navy and National Guard and veteran officers and civilians—the latter to represent the employing class.

This would give the body a status and establish a central board of trustees to take charge of any trust funds, etc. Every Regular and National Guard regiment voluntarily contributing a small annual amount (say \$50) towards the administration funds could be entitled to have an officer on the governing board and the privilege of having honorably discharged members admitted to the Corps, if otherwise worthy, in preference to others—for the number would be limited.

A small executive committee of officers could pass upon the qualifications of applicants, and none be admitted who are not able-bodied and whose character, both while in the Service and since leaving same, has been unquestionable.

It should be clearly borne in mind that it is not proposed to make this organization a "charity" but merely a guide to "self-help."

A CONSIDERATION OF A CANADIAN SOLUTION OF THE PROBLEM OF INFANTRY FIRE TACTICS.

By FIRST LIEUTENANT GUY HOWARD, U. S. A.,

TWELFTH INFANTRY, AIDE-DE-CAMP.

IN a lecture delivered on April 26, 1890, at the Canadian Military Institute, Toronto, Major C. B. Mayne, R. E., Professor of Surveying, etc., Royal Military College, Canada, outlines a modern battle, one between two highly organized and trained forces, armed with modern weapons and skilled in their use, dividing it into four periods.

1st. The Period of Reconnaissance, when the advanced troops of the defense are driven in and his position ascertained.

2d. The Period of Preparation or Destruction, which lasts till the preparatory artillery fire has produced a considerable effect and the infantry and machine guns have been pushed forward till they can with their fire begin to effectively assist in the destruction of the enemy. The attacking line may be assumed to have arrived within six hundred yards of the defended position, when the lessening efficiency of the latter's fire indicates the time for

3d. The Period of Decision, which is carried out with the greatest energy and celerity. The fire is maintained, the advance by rushes with short halts to fire is continued, bayonets are fixed, a rapid fire delivered at about one hundred yards, when the advance is sounded and "the charge takes place over the last fifty yards with cheers, bugles sounding, drums beating, colors flying, and all the pomp and dash of war."

4th. The Period of Completion or Retreat. A retreating enemy should only be pursued by fresh troops, but subjected to volley firing if no fresh troops are available.

Thus he describes a battle as a long drawn-out fire combat, and a short, sharp, decisive, close combat. During the fire combat both sides get gradually disorganized and demoralized, but victory remains with the side which, at the decision, is least demoralized. This demoralization being effected by fire alone,

he urges the consideration under the name of *fire tactics* of how best to employ the fire to get the best results with the least expenditure of ammunition.

Presuming that the value of all weapons depends on the men using them, and that men are controlled more by emotions and habits than by a mere knowledge of what they ought to do, and while training and discipline are powerful means of overcoming fear of death and pain, and dislike of fatigues, and making men more amenable to control in the excitement of battle, the problem which he undertakes particularly to consider is: "How to make the best use in battle of the fire of the Snider Rifle with which the Canadian Militia is armed?"

In view of the inferiority of the Snider as a modern weapon he suggests as one consolation to the Canadian officers, that the French were better armed than the Germans in 1870, and the Turks than the Russians in 1878, and yet both French and Turks were defeated chiefly because their opponents made a better use of what they already possessed.

For the fire combat the necessity of knowing the range is given as the *sine qua non*, and he concludes, notwithstanding the many maps, range finders, etc., the only really available means by which ranges can be estimated for infantry at all times is by the eye. He suggests the German custom of the six best men guessing the range, and the captain taking the average as a basis for his orders. Then wind, temperature, barometric pressure, the inclination of the line of sight up or down, relative movements, must be considered by those looking after the men.

Uncontrolled or independent fire, where each man chooses his own target, his own elevation, his own rapidity of fire and his own time for opening and ceasing fire, is condemned.

Controlled fire is considered under two conditions :

- a. *Individual firing.*
- b. *Collective firing.*

He shows Individual firing in war to be as a rule inaccurate, by reason of uncertainty of range, uncertainty of the effects of previous shots fired, fatigue, panting for lack of breath from running, excitement, danger; many of which causes of inaccuracy increase as the enemy is approached. Therefore men must be taught not to expect too much from their individual fire in the field, and to make the best use of the fire of the troops in an

action, he endorses the idea of Major Meg of the Bavarian Army, "that to reduce the inaccuracy of individual fire as much as possible it must be confined to ranges at which the bullet does not rise more than the height of a man above the line of sight, which limits this with the Snider to three hundred and fifty yards, using the three hundred yard back sight and aiming at an enemy's feet.

Before considering collective fire he subdivides ranges into:

1. *Short*, within 350 yards.
2. *Medium*, within 700 yards.
3. *Long*, to 1700 yards.
4. *Extreme*, all ranges over that, and limits the use of individual fire to the short range.

Collective firing, used for all ranges beyond *short*, concentrated on stated points is based on the principle that if it takes a man thirty shots in the field at six hundred yards to hit an upright enemy, of thirty men, each firing one shot at the same time with a reasonably correct elevation of sight, one is quite sure to hit. The dangerous zone of a collective fire is the beaten zone both in front of and behind the target, due to individual errors of men trying to fire at the same range, *plus* the zone grazed by the bullets falling nearest the firer.

This zone can be increased by having some sights set higher or lower, but only at a proportionately greater consumption of ammunition.

Fire at extreme ranges to take advantage of the long ranging power of modern rifles is suggested as a treat when there is ample ammunition, ranges known, the effect can be observed and the target is of suitable dimensions.

In discussing the direction of the fire, Major Mayne concludes with regard to (1) opening and closing fire, *the attack* should get as close to the enemy as possible without suffering undue loss before opening fire, not, even in an open country, commencing fire beyond the *medium ranges*, especially by troops carrying the Snider and the very limited supplies of ammunition which heavy ammunition entails

In the defense, fire may be opened at long ranges, as the defenders should always know the distance to various prominent objects in their front.

In temporary actions and false attacks long range fire is recommended, or in lack of artillery to prepare for infantry at-

tack, in which case a large supply of ammunition should be provided and special troops detailed for this purpose.

As regards (2) the amount of ammunition to be expended and (3) the number of men to be employed in the firing line, we must remember that the moral effect of losses is greater the more quickly they are inflicted. Therefore it is recommended to use as many men as possible, without having undue exposure to losses from the enemy's fire *until* the effective ranges are reached, and then, of course, all the men that can fire effectively.

(4) The fire must be in long and medium ranges directed on stated objects, usually the most advanced portions of the enemy and the target not too frequently changed. The usual mark is the nearest hostile smoke of rifles or artillery. Each portion of a line should be allotted its task.

(5) The range for all must be carefully attended to, it being more important than individual skill.

(6) Observe the force of the bullets on grounds suitable for observation, and remember that to one on the right of the men firing, a too short fire will appear to fall to the left of the mark and a too long to the right.

(7) Under collective fire control can be best maintained by (a) *volley firing*, or (b) *mass firing* of a limited number of rounds; but he concludes that *volley* firing should be confined to the longer ranges before the organic units are mixed. He advocates the use of a shrill whistle to warn the men to cease firing after the three or four rounds of *mass* fire that have been ordered. "Distinct pauses must be made now and then in the firing along a wide front, that of a battalion at least," to allow smoke to clear away, objectives to be chosen, and ranges corrected. To do this one commander must command as long portion of the firing line as possible, *viz.*, that of a battalion. This will be about two hundred yards.

(8) Careful aiming and firing are required for all firing, a slower fire for bad targets.

Rapid firing should never be allowed to sacrifice careful aiming.

(9) The moments of advancing and halting must be left to the senior officers in the firing line. As a rough rule in advancing by rushes, after three shots per man at a new range the line should advance.

(10) While men are authorized to lie down at long ranges,

they are bidden to kneel at medium and stand at short ranges, for the reason that if they are allowed to lie down at short ranges it is too hard to make the men get up again to continue the movement forward.

(11) Fixing of bayonets is considered a sign that it is safer to go forward than to retire, and three hundred yards is given as the point to order them fixed.

(12) Replenishing ammunition under an effective fire is so difficult that men must be given all the ammunition they require before being sent into action, leading troops a hundred and fifty to two hundred rounds per man, while those intended for the assault fifty to seventy.

Much of Major Mayne's matter applies to the Springfield rifle and such partially trained but personally brave infantry as we must expect to employ in war, that the substance of his lecture deserves our special consideration. Doubtless most engagements will only progress through the first two of the periods given, when a partial success or defeat will be accepted or the construction of field intrenchments, a discussion of which is not introduced into the lecture, will change the nature of the combat. But upon that portion of a front where the final decision is sought the last two periods must occur, either in the open or in the attack and defense of field trenches.

The importance of knowing the range is not made too prominent. While by much known distance and skirmishing firing, our Regular troops may be trained to such an extent that independent fire so far as elevation and rapidity of fire may be somewhat permitted, no militia or volunteers can have this training nor be given so much latitude. Some practice in controlling fire far more closely than we now do is needed. The inutility of volley firing has too often been shown with even pretty well trained troops, but the mass fire of three or four rounds is not much of an improvement. The drill should be constant in firing with powder cartridges, the men in sections or squads being called by name by the section or squad leader, and the fire along the line stopped at command, indicated best by the whistle. Advancing by alternate subdivisions of various sizes, one rushing while the other fires should be much practised.

The summing up given under eleven heads is generally that of the tactical methods recommended by the best authorities, but as the lecturer in a previous case says, we must consider human na-

ture first, so under the tenth I think we should realize that as even at the shortest ranges men advancing will throw themselves down at halts for cover, we should accept that and drill to establish the habit of getting up again to go on, instead of trying to keep them standing to fire and get breath.

So in the matter of fixing bayonets (eleventh) if necessary at all except in darkness, woods, brush or fog, no troops are likely to attack over ground so smooth that there is not some cover within three hundred yards of an enemy from which the final spring should be made, and the fixing bayonets would then not only indicate that it is safer to go forward than to retire, but be a sure signal that for that portion of the line at least the time for the decision had come.

I think, however, there are few fields where a battle may be fought on this continent where, after a moderately successful fire fight, the assaulting troops may not be brought within a hundred yards of a point to be assailed under at least partial cover without either firing a shot or being much exposed to hostile bullets.

We must seek cohesion and control by each commander having to look after only a few, two to four, units of command of the next size smaller than his own from the corps to the squad. We may neglect elaborate dispositions in rear of the firing line because that line will stay where it is put better with our men than with European troops, but we must not omit to see that it has abundant ammunition when deployed and is superior in fire, by reason of numbers, better weapons, or training to the return fire of the portion of the enemy's position selected as a target. This line pushed forward and partially intrenched within an effective range will be the *point d'appui* for the assaulting force, taken from other troops, advancing usually without firing in successive open order lines from the nearest cover to close in as a swarm upon the selected point of the enemy's position.

Reprints and Translations.

THE EFFECT ON CAVALRY OF RECENT IMPROVEMENTS IN FIRE-ARMS.

By CAPT. G. O'CONNOR, QUEEN'S BAYS.

(Reprinted from the Journal of the United Service Institution of India.)

IN common with the other arms of the Service, the cavalry are about to enter upon a new epoch, one fraught with enormous consequences either for good or bad.

That the new departure will be to their advantage, is the opinion of many who have devoted time and attention to the subject. On all sides we see a growing conviction that despite modern arms, cavalry will be called upon not only to assist in producing results on the battle-field, both by the action of large masses and of individual regiments and squadrons, but to so influence the preliminary stages, that the ultimate decision will to a large extent depend upon their services.

To find a parallel with the present high state of excellence and preparedness, imposed by all the principal military nations on their mounted troops, we must go back a century and a half.

That famed military commander, Frederick the Great, with the intuition of genius, had early seen the enormous power inherent in good cavalry. With the time when he commenced to introduce those principles and ideas, which have so successfully stood the test of time and experience, and the present day, a certain resemblance can be traced; then, as now, mechanical and other improvements had brought the infantry nearly to theoretical perfection, and at the same time, great attention was being paid to the mobility of large masses of cavalry with a view to united and overpowering action.

At the beginning of the last century, most of the great battles had been decided by the cavalry: Blenheim, Ramillies, Turin, Almanza and others, all were eloquent of the invincibility of this arm; but at Mollwitz a new era commenced. Infantry marching with great exactness of drill and mobility, and armed with muskets provided with the latest improvements of their time, not only stopped the onset of the successful Austrian cavalry, but after repelling five charges decided the battle.

Whether the defeat of the Prussian cavalry by the Austrian, or the success of the Prussian infantry against the same cavalry, drew Frederick's attention to the necessity of improving his mounted troops, it is impossible to say, but after the first Silesian war, he laid down a system of drill and

tactics, the exactitude of the main principles of which are even now incontrovertible; and which at the king's death enabled the Prussian cavalry to boast of the glorious record of fourteen pitched battles out of a total of twenty-two, won by them.

From those days until the introduction of rifled arms, although the systems of armament remained the same, and the change in tactics, introduced by Napoleon, was in favor of the cavalry—after a lapse of one hundred years, we find the cavalry considered the least important unit in armies, and justifying in every respect the correctness of the views of those by whom they were so lightly esteemed.

The want of energy in the advanced guard duties after the Alma; the supineness of the Light Brigade during the engagement of the Heavy Brigade with the Russians; the Russians repeating their extraordinary mistake of receiving a charge at the halt; and the terrible blunder with the Light Brigade disclosed a state of inefficiency equalled but not surpassed by the Austrian and French cavalry in the later wars; from this reproach Prussians should not altogether escape, considering their few successes relatively to the mass of cavalry they brought into the field, and the demoralized state of their opponents.

The poverty of performance by the cavalry in the last great wars, and the terrible loss inflicted on them by the infantry on several occasions, gave rise on the part of various military writers to the opinion, that owing to the increased range and precision of modern fire-arms, a great curtailment of the sphere of cavalry on the actual battle-field had taken place.

With all due respect to this opinion, as far as the infantry are concerned, it is capable, if not of actual disproof, of some qualification.

If the assumed curtailment had been attributed to the rapidity of fire of the new weapons, combined with an unreasoning dread (born on the rifle range) of their effect, engendering timid leading, there would have been good grounds for the opinion.

To-day we are face to face with the results of a quarter of a century of mechanical improvement, all tending in the direction of increased rapidity of fire, until it may be truly said, never before were the infantry, theoretically, so potential in offense or defense. Turning to the artillery, we find them possessing guns of increased range and precision, and animated with a determination to avail themselves to the utmost of their advantages. Still we are given to understand, that, in defiance of these deterrent causes, the sphere of cavalry usefulness has been enlarged not decreased, and that a great day for the cavalry arm is approaching.

To reconcile this apparent contradiction, it is necessary to keep before us, that although the armament of the infantry and artillery has improved, the fundamental conditions of warfare remain the same, the men are still flesh and blood, subject to the same hopes and fears, the same liability to weakness and fatigue, exultation and panic, and that the modification in tactics, the result of recent improved armaments, by giving increased prominence to moral effect, tends distinctly in favor of the cavalry.

Cavalry must never forget that their greatest successes against infantry have been achieved under favorable conditions.

In the belief that the lessons of the past are still valuable as a guide to the future, and to remind cavalry officers that other factors besides armament have to be considered, we will take as illustrations, various representative occasions on which cavalry have been defeated by, or were victorious over, infantry.

Although Europe is much more thickly cultivated now than in the days of cavalry pre-eminence, in the East immense level plains still afford us a fair field. The lesson taught the Afghans outside Fatehabad and Jalalabad, by the cavalry of Sale's brigade, has never had to be repeated.

At Eylau, Augerau's corps was destroyed by the Cossacks, during a snow storm. At Marengo, Kellerman's cavalry were concealed by vineyards from the Austrians, until the moment of that fateful attack which decided a campaign. At Salamanca, Clausel's division of veteran French infantry, standing with the sun in their eyes, and in clouds of dust from the light soil, were simply annihilated by LeMarchant and Anson's cavalry. Murat's successful charge at Dresden was made during heavy rain. At Albuera also, Colborne's British infantry, firm with the consciousness of never having suffered a check, were defeated by the French horsemen in heavy rain. Under cover of the darkness at Vionville, the 6th Prussian Cavalry Division approached close to, charged, and broke some French squares.

From the foregoing it will be seen that weather is an important factor in weighing the probable result of a collision between the mounted and dismounted arms.

The saying, that good unbroken infantry can never be defeated by cavalry, is only half true, and like most generalizations requires qualifying. Good infantry, in all formations, have been broken by cavalry, both in the distant and in the immediate past. At Austerlitz, Vandamme's column whilst engaged with opposing infantry, was destroyed by the Russian cavalry. Near Hanan, in 1813, twenty squadrons of Russian cavalry broke and captured a French division, formed in eight squares, and supported by eighteen guns. An Italian infantry brigade surprised by Austrian cavalry at Custozza, were routed with a loss of four-fifths of their number. At Langalzala also in 1866, the Hanoverian cavalry broke two Prussian squares, the infantry being armed with the needle gun. Bredow's brigade at Vionville charged and rode over French infantry in line. At Amiens also the Germans rode down a battalion of marines.

On the other hand, when cavalry action admittedly decided great battles, we find the same cavalry under similar conditions, and frequently under the same leaders, used against infantry but ineffectually.

In former days, although the infantry shoulder to shoulder formation with deeper ranks, and the heavier calibre of their muskets gave a greater weight of metal on a given space, their shorter range necessitated allowing the cavalry to approach quite close, and the difficulty of loading precluded more than one volley being delivered by each rank; yet we see at Salamanca, D'Urban's cavalry defeated with loss by French infantry in line, and at Venta de Pozo, French cavalry after defeating some German and Peninsula horsemen were repulsed by Halkett's infantry in various formations.

The terrible slaughter outside the British squares at Waterloo, shows very conclusively that the effect of a volley, was quite as deadly with what those who had used it fondly called "the Queen of Weapons," as with the present rifle. In connection with the most recent instances of the repulse of cavalry by infantry, we have a clear proof of the effects of rapidity of fire.

The Prussian infantry at Mars la Tour reserved their fire until the French cavalry were within 250 yards, then by rapid firing having nearly annihilated their first line, were still able to fire at the second and third.

In Bredow's charge, the French infantry, owing to their fire being masked, were unable to deliver it until the cavalry were close on them, when, if precision had the important effect which is claimed for it one volley would have been sufficient.

The repulse of the French charge at Woerth was effected by rapid independent firing from infantry in retirement. At Mouzon, also by the same means, one company extended beat off a French cuirassier regiment.

The cavalry charges at Sedan afford an exceptionally good illustration of the effects of rapid fire. There everything was in favor of the cavalry, whose approach was concealed from the infantry lines until they were within a short distance of their flanks, and yet, although ridden through with the determination of brave men, the charges were fatal to the cavalry.

Whilst admitting that the successful result of cavalry action against infantry is largely dependent on favorable circumstances, we claim that these circumstances are liable to, and will recur.

With the other arms the result of an attack depends mainly upon the due observance of certain elementary rules, any deviation from which is certain to lead to disaster, but against infantry the result can never be foretold; for instance, when Napoleon ordered the Polish lancers to charge up the pass at Somo Sierra, the wiseacres, who thought it a mad proceeding, little foresaw that it would cause the Spanish infantry to fly from their intrenchments. Had Bredow's charge against Canrobert's division at Rezonville not taken place, what a different complexion the struggle might have assumed.

That the introduction of repeating rifles and smokeless powder will effect the cavalry revival is certain, but how, and to what extent, is the problem. The clue to this question will be found in summarizing the disadvantages, from the infantry point of view, of the new conditions:

First.—That owing to the increased range and flatter trajectory of the new weapon troops will have to assume formations, offering as small a target as possible, at distances hitherto never thought of, thus rendering them particularly liable to opportune cavalry attacks. Already a warning with regard to this has been uttered. The greatest Russian authority on tactics having cautioned the infantry against attempting to repel cavalry in other formations than those, which, bringing as many rifles as possible to bear, will only expose immediately to the attack the smallest possible number of men.

Second.—To allow the soldier to carry the increased number of rounds required in the magazine, the calibre of the bullet has been lessened. An

idea was prevalent that this small bullet would not possess the necessary stopping powers against cavalry, but from some experiments conducted in England, at which the Inspector-General of Cavalry and several veterinary surgeons were present, the conclusion has been arrived at that the size of the bullet will make no difference in its effect on cavalry. Despite this *ex-cathedra* opinion there is a lurking belief that in the mad excitement of a charge the small bullet will not be able to stop the impetus of an excitable animal like the horse.

Third.—To exercise an adequate control over the natural inclination, with such ready means at hand to get rid of ammunition, increased stringency in fire discipline has to be resorted to. The vast importance attached to fire discipline points this out as the weak spot in the new conditions.

Not only has provision to be made for controlling the men, so that the most important objective for the time being is under fire, but still more difficult, that such an expenditure of ammunition does not take place, as will leave the soldier defenseless at the most critical moment. Coupled with this is the hitherto unsolved problem of the effective supply of ammunition during the ever varying phases of a fight,

The importance of this last condition is evident from one of the avowed objects of magazine fire, that of its efficacy against cavalry. With the exception of the Russians, who have not yet adopted a magazine rifle, the other continental powers consider that the magazine, if brought to bear on cavalry when within 250 to 300 yards, will, supposing the attack pushed home, rain such a shower of lead that the attack must needs fail, provided that the magazines are full at the required moment.

With the use of smokeless powder another factor in favor of the cavalry has been introduced. Not only will a better view of the scene of action be obtained, and more opportunities for effective action afforded, but increased moral effect will be brought to bear. Assuming that cavalry will not usually attack infantry unless the latter are engaged with opposing infantry or are under artillery fire; from the moment the infantry become aware that they are the object of a cavalry attack until the moment when, from their proximity they can open fire on them, the moral effect on the assailed increases in direct proportion to their want of discipline and natural courage.

It is in this, the moral effect of cavalry, that the deductions of the tacticians of the rifle range are so unreliable, very few men are able with equanimity to contemplate the onset of a crowd of galloping horses.

All the recent developments of the fighting strength of nations has tended to make *morale* a factor of increased importance.

In the next great war the infantry soldier will be without the support of comrades close to him, he will be exposed to unseen and unheard fire, besides having longer distances to traverse before seeing the effect of his own fire on the enemy, and no longer will the noise and smoke of his own and comrades' firing give him heart or screen him from view. On the other hand, the cavalryman is less liable to dispiriting moral influences, such as treading on his own dead, and hearing the cries of the wounded; should he come under unseen fire his mobility enables him to avoid the dangerous

zone quickly, movement is the essence of his existence, the natural exhilaration of galloping, the closeness of his formation, and the presence of his officers in front, all tend to make him at the supreme moment confident of success.

In short, the conviction that the days of effective cavalry action against infantry have not past is founded on the belief, that with weapons requiring delicate manipulation, perfect discipline, and tactical formations based on intelligence, and great moral courage, the advantage remains with the cavalry. The infantry soldier has not the time or opportunity to acquire the veteran spirit necessary to enable him to use his great advantages with the best effect, and will thus fall a victim to the more natural weapons and applied strength of the cavalry soldier.

SMOKELESS EXPLOSIVES.

(From the Royal Engineers' Journal of June 2, 1890.)

THE production of smoke by gunpowder is often a source of considerable inconvenience in its employment for naval or military purposes, although the shroud of smoke attendant on musketry or artillery fire is often an important advantage to one, or other, or both, the belligerents. Until within the last few years, however, but little thought appears to have been given to diminishing this production of smoke, except by the sportsman, who was led to look hopefully to gun-cotton, on its first production, in 1846, as a probable source of greater comfort and success in the pursuit of his pastime.

The cause of the production of smoke by gunpowder, and the absence of it in the case of gun-cotton, is due to the difference between the chemical changes which take place, the products of explosion of the latter consisting entirely of gases and water, while those of the former are mainly solids. In ordinary gunpowder the solid products amount to over fifty per cent. by weight, of the total products of combustion.

Until within the last six years the gunpowders applied to war purposes in this and other countries have varied little in chemical composition; but the introduction of rifled artillery, and the increase in its size and power, rendered investigation necessary, with a view to modifying its action when fired, and to obtaining the best results possible from different calibres of guns. It was, for many years, sought to control the violence of explosion by modifying the size, form, density and hardness of the individual masses of the charge, it being thought that, as the usual proportions of saltpetre, charcoal and sulphur very nearly correspond to those required for the development of the greatest chemical energy, such modification was preferable to that of the proportions or chemical character of the ingredients.

The varieties of powder introduced for artillery from time to time have been of two distinct types; the first produced by breaking up pressed cakes

* From a Paper read by Sir F. Abel, C. B., etc., at the Royal Institution of Great Britain.

of powder into grains, or pebbles, of approximately uniform size; the other by pressing equal quantities of the same mixture of ingredients into moulds of uniform size, under conditions as nearly as possible uniform in all respects. Practical experience, however, with pellet, and other powders of this type, showed that uniformity in the ballistic properties of black powder could be more readily secured by thoroughly mixing together batches which varied somewhat in density, hardness, etc., than by attempting to obtain absolute uniformity in the nature of the individual masses of a charge.

When first it was actively sought, in this country, to modify the ballistic properties of powder, the question had already been partially investigated in the United States, where, as also in Russia, prismatic powder had been adopted for heavy guns; and, whilst its manufacture was being perfected in Russia, Germany and this country, practical investigations resulted in the production of the excellent Fossano powder of the Italians, and of our own powders, known as P^g and C^g, at Waltham Abbey.

Researches of Captain Noble and Sir F. Abel showed, some years back, that it might be advisable to alter the proportions of the constituents by increasing that of the charcoal, and reducing that of the sulphur, and they also threw considerable light on the cause of the erosive action on the inner surface of the gun, showing that the explosive which furnished the largest proportion of gaseous products with the smallest amount of heat exerted the least erosive action.

Meanwhile, two eminent German powder manufacturers had occupied themselves with the question of the production of something more suitable for heavy guns than varieties of the ordinary black powder, not only by means of altering the proportions of the ingredients, but also by modifying the character of the charcoal used, and had invented a slower burning brown prismatic powder, composed of a somewhat higher proportion of saltpetre, much less sulphur, and very slightly burnt charcoal. The smoke produced by this powder is, at first, nearly as dense as that of black powder; but it certainly disperses more rapidly. It was, however, desirable to obtain a powder which burnt still more slowly for use with the heaviest ordnance, and the proportions of the ingredients have, accordingly, been modified to suit these conditions; while a powder, intermediate between the black pebble and the brown, has been found best for ordinary heavy guns.

The recent adaptation of machine and quick-firing guns for naval purposes—especially for the use of ships against torpedo boats—has, during the last few years, rendered a more or less smokeless powder desirable for naval use, and many military authorities consider it also desirable for field artillery and small arms ashore.

The properties of ammonium nitrate of which the products of decomposition by heat are, in addition to water vapor, entirely gaseous, rendered it a tempting material to work upon with those in search of a smokeless powder; but its deliquescent character was a great obstacle to its employment. Mr. Heidmann has, however, succeeded in producing an ammonium nitrate powder of remarkable ballistic properties, which furnishes comparatively little smoke, speedily dispersed, and is less hygroscopic than any such

preparation hitherto made ; it also yields a far larger volume of gas and water vapor than black or brown powder, is much slower, and produces greater ballistic results, while the chamber pressure is lower, and the pressures along the chase of the gun are higher, than in the case of the latter.

The ammonium nitrate powder contains more water than even the brown, and if the atmospheric moisture approaches saturation will rapidly absorb water ; and though the charges for quick-firing guns be securely sealed up in metal cases, the cartridges, if kept for long in ships' magazines where the temperature is high, sometimes for considerable periods, the expulsion of water from some portions of the powder masses composing the charge may give rise to a want of uniformity in the action of the powder, and the occasional development of high pressures. It is not, therefore, uniformly well adapted to the requirements which it should fulfill for naval purposes.

Although it was reported about four years ago that marvellous velocities had been obtained in France from small charges of a new smokeless powder used with the Lebel rifle, and the secret of its precise nature was well kept, it is now well known that more than one smokeless explosive has succeeded the original powder, and that what is now used with the Lebel rifle is very similar to preparations patented in this, and still experimented with in other countries.

In smokelessness nothing can surpass gun-cotton ; but even if its combustion could be properly controlled, and it be used in very small quantities, there are so many difficulties in adapting it to naval or military uses that it is not surprising to find such attempts to fail for the first twenty-five years. Soon after its invention in 1846, gun-cotton wool rammed into cases was tried as a charge for small arms, but with disastrous results. Subsequently Von Lenk made the first practical approach to regulating the rapidity of burning of gun-cotton by converting coarse or fine, loosely or lightly twisted rovings of finely carded cotton into the most explosive gun-cotton, and arranging them so as to modify the compactness, extent and distribution, of the enclosed air spaces. Thus, small arm cartridges were composed of compact layers of tightly-plaited gun-cotton thread, cannon cartridges of coarse, loose yarn wound compactly on a core, charges for shells of very loose, hollow plaits, and mining charges of very tightly twisted rope with a hollow core. It was found, however, that owing to some slight unforeseen variation in the material, or in the air spaces, very violent action was sometimes produced, showing that this system was quite unreliable. The Austrian government began, in 1862, to adopt Von Lenk's system, but unsatisfactory results soon caused them to abandon it. Our own attention was in this way drawn to the subject of gun-cotton, and one of the results of Sir F. Abel's researches was a vast improvement in the method of preparing it, viz. : by reducing the partially purified cotton fibre to pulp, then completing its purification, and afterwards converting the finely divided explosive into highly compressed masses of any desired form or size. This system of manufacture has been in extensive use at our government works for over eighteen years, and has been copied from us by France, Germany and other countries. No success had attended the experiments in England with can-

non cartridges made on Von Lenk's plain, even for small field guns, and in those days the military authorities were not alive to the advantages which might result from the use of a smokeless explosive for military small arms, with which, however, far more promising results had then been obtained at Woolwich.

Abel's system of preparing gun-cotton was no sooner elaborated than it was sought to adapt it for the manufacture of smokeless cartridges for sporting purposes, and after a series of experiments with compressed gun-cotton arranged in various ways, very promising results were obtained with a charge of pellet form, especially with the Martini-Henry rifle. A nearly smokeless sporting powder had meanwhile been produced by Colonel Schultze, which, when subsequently modified, considerably resembled the E. C. powder, a granular nitro-cotton powder consisting of trinitrocellulose, incorporated, when in the form of pulp, with nitrates of potassium and barium. Both these powders produced some smoke when fired, and could not compete with black powder in accuracy of shooting when used in arms of precision. In past years both camphor and liquid solvents, such as acetic ether and acetone, for gun-cotton, and mixtures of alcohol and ether for nitro-cotton, have been used to harden the granules and render them non-porous, the two former having been used in the French and German smokeless powders.

Much mystery has shrouded the nature of the first smokeless powder adopted by the French for use with the Lebel rifle. The visible powder was in the form of yellowish-brown tablets from 0.07 to 0.1 inch square, and of the thickness of stout note paper, and appeared to contain, as an important ingredient, picric acid, which is obtained by the action, at a low temperature, of nitric upon carbolic and cretylic acids. When sufficiently heated, or set light to, it burns with a yellow smoky flame, without exploding; but, if detonated, and containing as much as 15 per cent. of water, it explodes with very great violence. It is no longer a secret that picric acid also forms the basis of the mysterious French explosive for shells, etc., the destructive effects of which have been described as marvellous; and it is certain that this picric acid powder was so deficient in stability as to cause its being abandoned in favor of another, and probably simpler, form of smokeless powder.

In Germany the subject of smokeless powder was meanwhile being steadily pursued in secret, and a small arm powder, giving excellent results in ballistic properties and uniformity, seems to have been for a time adopted, but to have proved deficient in stability. Numerous patents have also been secured, especially by German makers, for the conversion of trinitrocellulose, and other forms of nitrated cotton, by the action of solvents, into horn-like materials, which, when in form of a jelly, can be formed into rods, tubes or sheets, and afterwards, when hardened, cut up as required. Several powders of this nature were brought forward as counterparts of the French smokeless powder.

Mr. A. Nobel was the first to apply nitro-glycerine, in conjunction with one of the lower products of nitration of cellulose to the production of a smokeless powder, which bears great resemblance to blasting gelatine. When

nitro-cotton is impregnated and allowed to digest with nitro-glycerine, it becomes gelatinized, and the two substances furnish an almost compound product. Such preparations are important as blasting agents more powerful than dynamite, and their prolonged immersion in water does not separate from them any appreciable proportion of nitro-glycerine. By incorporating with nitro-glycerine a far larger proportion of nitro-cotton than in the case of blasting gelatine, and by the use of camphor to promote the union of the two and apparently to reduce the violence and rapidity of explosion, Mr. Nobel has obtained an almost horn-like material, which can be pressed into pellets, or rolled into sheets, and which compares favorably with the somewhat similar gun-cotton preparations just referred to, both in ballistic properties, stability and uniformity, beside being almost entirely smokeless. The evaporation of some of the camphor retained in this powder renders it liable to be modified in its ballistic properties by being kept for any time; but it is believed that Mr. Nobel has dealt with this defect, and favorable results are reported from Italy of his powder, as tried in small arms, while Mr. Krupp is said to be experimenting with it in guns of several calibres.

The Government Committee on Explosives, in trying to remedy the above defect in Nobel's original powder, were led to the preparation of other varieties of nitro-glycerine powder, which, when made up into sheaves of wires or rods have given excellent ballistic results in the service small bore rifle. The most promising of these which is smokeless, and stable, is now being tested with a view to obtaining a powerful explosive which heats the arm less.

The erosive action of powders of high energy is naturally far greater than that of the black powder, especially as the barrel remains clean, and when, in addition to this, it is remembered that it has to be adapted to suit an arm, cartridge, and projectile originally designed for use with black powder, it will be seen that the devising of an explosive at once practically smokeless, sufficiently stable, and perfectly safe for use under all service conditions, as well as easily made, and not too costly, is but a small part of the difficulty of adapting a smokeless powder successfully to the new military rifle—a problem now apparently approaching solution. Experience with smokeless powder devised for our Service with guns from 1.85 to 6 inches calibre has already been very promising, but shows that, to utilize its advantages fully, it will be necessary to modify the designs of the guns, in reducing the size of the charge-chamber, and strengthening, if not lengthening, the chase. And when it has been adapted for use with all such guns, the question arises as to whether sufficient confidence can be placed in its stability under storage conditions, in ships and on land, in all parts of the world, to warrant its adoption wherever its use may present advantages.

Opinions differ as to the importance of such advantages, which are, however, founded on a sound basis, and some military authorities consider that the use of such powders must effect a great revolution in the conduct of campaigns. Their noiselessness, however, is, of course, a fallacy, for the reports produced by different varieties of them are really sharper and more

ringing when heard close, though they are not of such long duration, nor so audible at a distance. The present German service powder is not actually smokeless, but the thin cloud produced is rapidly dissipated, and independent firing is not rendered visible by the smoke at 300 metres.

The absence of smoke in future warfare can scarcely fail to change many of the existing conditions under which engagements are fought, but there can be little doubt that both belligerents will use smokeless powder, and, therefore, be under the same conditions. For the naval service the advantages of a reliable powder of this kind for machine and quick-firing guns can scarcely be overestimated, and their realization before long may be anticipated with confidence.

LETTERS ON ARTILLERY.

By PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by Major W. L. HASKIN, U.S.A.

XII.

UPON THE MANNER IN WHICH FIELD ARTILLERY WILL BE EMPLOYED IN THE FUTURE.

WHEN I brought my last letter to a close I believed that I had fully answered your inquiries as to the manner in which the transformation of our artillery was accomplished between the wars of 1866 and 1870. I believed that I had gone to the very bottom of the subject and could have nothing further to say upon field artillery.

But you continue to question me. You wish among other things to have my opinion upon the manner in which field artillery will be employed in future, now that its sphere of action has been so greatly extended that marked results are obtained at 5500 yards with shell, and very considerable results at 3800 yards with shrapnel, while at distances between 2200 and 2700 yards the effect produced may almost be called destruction if the results obtained on the practice ground may be safely be taken for the base of our speculations.

If you desire to inform yourself as to the results you have but to purchase the Regulations of 1877, all booksellers have them and they give the required tables.

I had almost decided not to go into the study of this question in detail, for in the first place I have been almost a stranger to the arm for as much as twelve years, and am, therefore not qualified to give an exact account of its present state; I am ignorant of its secrets, and on this account I cannot pronounce a judgment which should be accepted as definite. I could only say to you—leave the past to the old, and for what is to be, turn to the young.

Secondly, I could say that I have devoted ten letters to the exposition of

the transformation in the principles relating to the employment of field artillery between the years 1866 and 1870, brought about by the improvement in precision of fire and by the increase in range. These principles, as I have said, were put to the proof in 1870 and 1871 and passed it most successfully.

I could also decline to comply with your request in stating my belief, that even more considerable improvements still would in no wise change the system, but simply cause the artillery to take another step in advance in the direction which it has already adopted and found to be good.

Finally, I could recall to your remembrance that in 1869 I presented to the Military Society at Berlin, a paper in which I developed my ideas in regard to the employment of field artillery as combined with the other arms when all the troops were provided with rifled arms. You were present. My paper was printed and was for sale, and I could only add that my experience in 1870 and 1871 furnished no occasion for modifying my ideas.

But upon reflection I am obliged to acknowledge that the terms I have heretofore employed do not agree wholly with the present organization of the troops of our Army Corps, with their two infantry divisions, their corps artillery and, eventually, their brigade or division of cavalry: while, heretofore, we have spoken of the advanced guard, the main body, and the reserve of the Army Corps. I find also that I have given in many places as the maxima figures which no longer accord with the more extended range of the modern rifles. I would have to re-write my paper almost wholly to make it of any value or interest at the present time.

I have decided, therefore, while following the same train of thought as in my paper of 1869, to examine what modifications will be brought about in the employment of field artillery by the improvement in our arms since the last war.

To my great regret, I find myself obliged to abandon in many cases the method I have followed in all my preceding letters,—the reasoning by induction,—which bases itself upon known facts, and draws from experience the teachings which it contains. I must proceed by logical deduction, a method which, in the absence of experience, has recourse to speculation. But I can accomplish very little in any other way, for we have not yet acquired experience in actual warfare with the new field pieces.

I do not conceal from myself all the dangers to which I am exposed in using the method by deduction. Many a one has been led into speculations thereby which, later, in face of the reality, are crushed by the facts, and dissipated as the fog or the snow. Often the train of reasoning most perfect in its logic will bring us out far from the truth, for "all theory is but vain smoke," as the devil says in "Faust."

In the first place, we must establish with precision the spheres of action of the different arms from the results obtained on the practice-ground at the different targets.

Infantry aimed fire begins at 1760 yards, is sensibly felt at 1200 yards, and increases in effect till it can be called decisive at 500 yards; while at 200 or 300 yards, or at shorter ranges, its effect is destructive.

The effect produced by artillery fire begins to make itself felt at 5500

yards. Shrapnel fire becomes effective at 3800 yards or less, while its effect is decisive at from 2200 to 1600 yards or less. The effect produced by artillery at distances of 1200 yards or less is absolutely destructive, supposing the field of fire to be unobstructed. Since the shrapnel with fuse cut at zero produces such a murderous effect, the fire of artillery at short distances, which was thought to have lost in efficiency because of the small effect of canister from rifled guns, has become absolutely destructive.

The effect produced by cavalry is restrained to that which can be produced by the sabre, and in a front attack against infantry or artillery which is intact and is provided with ammunition, the terrain being unobstructed and dominated by the enemy, this effect at the present time is equal to zero. But this same cavalry has remained in possession of a force absolutely destructive as regards these two arms when it succeeds in surprising them, or when they are out of ammunition, or when they have become demoralized from any cause.

But the effect produced by the artillery is modified more than in the past by the skill of the gunners in aiming properly, in estimating the range correctly, in observing the effect of the fire, in giving the proper elevation for the range, in the quickness with which the enemy is perceived—qualities which the artillerist groups together under the one term "*einschieszen*."

As the distance increases, the difficulty of obtaining the proper range increases also, and finally becomes even problematical, because at the extreme range it is impossible to see even with the best glass.

The greater the range of the piece the more exact its fire should become, and the greater, therefore, the importance of aiming correctly, of observing the effect produced, of giving the exact elevation, and the less the importance of firing with rapidity.

But it will be a matter of great importance that the batteries take position rapidly,—more rapidly than the enemy,—and in superior number, in order to gain the time needed for careful firing, for obtaining the exact range, and for crushing the enemy by this superiority.

On the other hand, the enormous distances at which artillery can now open fire and reach the enemy have had the effect of introducing a new element which merits the greatest attention because it favors the assailant and will be of great importance to us, who, since the time of the Great King, assume the offensive from preference. In eight out of ten cases we can be sure that the artillery of the assailant will find in the terrain, at a distance from 3000 to 3500 yards from the defensive position of the enemy, positions which can be occupied without being discovered by the enemy; either by reason of darkness, or of bad weather, or because they are behind natural cover, or simply on account of the distance; positions in which the artillery of the assailant will be discovered by the enemy only when it opens fire. In the greater number of instances the assailant will consequently have time to establish his batteries carefully.

In 1870 our rifled pieces were of less range than at present, still I remember no case in which the fire of the enemy's artillery annoyed us in the lightest degree at the moment of opening fire. Our artillery alone—I

state only that which I have myself seen—has destroyed the batteries of the enemy as they unlimbered and before they could open fire. This was at Sedan, but occurred at a range of but 1200 to 1600 paces, and where we out-numbered the enemy greatly.

To fire too precipitately, to open fire upon fixed targets before obtaining the range accurately, that will have less effect now than ever before because our pieces are so much more accurate. More than ever the necessity will be felt of giving the artillery the needed time in which to fire each shot without hurry (it is not necessary to affect a pedantic slowness), for, as we have said, the too precipitate firing, by men who do not aim carefully, will produce no effect. A great noise is made, but it is a noise which inspires the enemy with courage.

With our artillery material of 1870 it was desired to confine the artillery combat to distances inferior to 2500 paces, because at greater distances this combat was but a useless cannonade. At present, since the terrible shrapnel carries to 3800 yards, we must begin the artillery combat at a distance of 4500 to 5500 yards. That does not prevent us, however, from seeking, whenever the thing is possible, to reach under cover a position at a less distance; for the first principle of action is that we should always endeavor to approach as near as possible to the enemy.

We cannot rely upon a decisive effect by the artillery at distances greater than 3800 yards (the regulations require even that they should be less than 2700 yards). This distance is still so great that mistakes may easily be made in observing the effect of the fire, and the enemy may be so covered that he cannot be seen. Hence we will be constrained in the greater number of cases to approach to a much less distance at the moment when we seek to strike the decisive blow. The artillery effect will at present become absolutely destructive only at a less distance than 1750 yards.

When opposed to infantry, artillery will, provided it has the choice, seek at the beginning to open fire at ranges greater than 1750 yards; but during the combat it should not hesitate to expose itself to infantry fire at a distance of 1200 or 1300 yards. But artillery, when unsupported by other arms, should avoid a nearer approach to infantry which is still intact. Should the infantry be broken and the artillery be acting in concert with the other arms, it should not hesitate to approach still nearer, especially if upon the defensive, for since we have in shrapnel cut at zero a projectile which produces such a destructive effect at short ranges, we can hope with this fire to repulse an enemy, even when he has advanced to the muzzles of the pieces.

The several objects which the artillery strive to attain remain the same as those you learned when cadet.

1. To open the battle.
2. To gain time.
3. To prepare for the decisive moment.
4. To divert from the other arms the fire of the enemy's artillery.
5. To pursue the enemy.
6. To serve as a support to the other arms.

In order that it may fulfill in a satisfactory manner these different

requirements, the chief of artillery must remain in permanent communication with the general to whom he is attached, and should make it his business to know what his intentions are.

I have spoken to you (in my seventh letter) in detail in regard to this matter.

Ordinarily the chief of artillery will either receive his orders directly from the general, or will know the object he designs to accomplish, so that he may be able to act accordingly when without orders. In the single case when the general directs his attack against an enemy who resists with such obstinacy that he finds himself obliged to bring his last reserves into action and to go in person into the midst of the conflict, in this single case the chief of artillery must act according to his own proper judgment. In this case the rules for his conduct are well defined. He must move quickly to the front to reach as quickly as possible the position seized by his general, for only the fire of his cannon will render secure a captured position.

Up to the present time the artillery combat which precedes each critical moment of the struggle has not appeared to be a decisive combat of itself, but simply a prelude to the battle, or at most a phase in the shifting struggle. Undoubtedly this will be changed in future. Shrapnel, and shell with double wall, produce such a murderous effect that it is permissible to consider the combat as decided in favor of that one of the two parties whose batteries shall have triumphed in the artillery duel. These batteries can then direct their fire wholly upon the other arms of the enemy. Hence the artillery duel will bring about the beginning of the final decision as soon as one side shall have obtained a preponderating effect with shrapnel. We should endeavor, therefore, more than in the past, to reach the field of action with great masses of artillery, in order to be so superior to the enemy in the number of our pieces as to crush his artillery at the outset.

Nothing will be more agreeable to us than to see the enemy's artillery come into line successively. It will be crushed battery by battery, and we will destroy them without loss to ourselves.

The more accurate the fire of artillery and the greater its range the more necessary it will be to bring it into action early and with all its force. It will therefore be employed in mass, and the principle must be established never to go into action battery by battery, but always by complete battalions.

Another argument in favor of this proceeding,—this requirement that we employ the artillery as a principle only in battalions of three or four batteries—is that it will then be easier to direct the fire, to observe the effect, to obtain the range, and to concentrate the fire of many batteries upon the most important point in such a way as to obtain a destructive effect.

But one exception will be made to this rule, and that is in regard to the artillery detached with a brigade of infantry or cavalry, or to an advanced guard or rear guard, having an effective strength so small that but one battery is sent with it.

While artillery should always consider as a first principle that it should avoid useless cannonades at long ranges, yet we shall often be con-

strained, in spite of ourselves, to open the artillery combat at considerable distances. This combat, however, becomes effective now at distances which, in the War of 1870, we were obliged to acknowledge would lead to a useless waste of ammunition. For this reason many engagements will not develop in future as they have hitherto. The table of ranges for our rifled field pieces for 1877 show an extreme range of 7700 yards, and at this distance half the projectiles reach a target but fifteen paces wide. If, then, for example, a battery on the defensive occupies a position on the prolongation of a road fifteen paces wide, it can, at the distance of almost a German mile, cannonade the enemy's columns on this road, and this so effectively as to make it very unwise for them to continue to occupy it. Therefore the assailant will be constrained to commence the artillery combat at very great distances in order to divert the fire of the enemy from the columns in march.

It could also happen that the artillery would be the object at which the enemy opens fire, and that it would be forced to reply, and that the artillery combat will therefore begin before the heads of the two infantry columns have met, while heretofore the dance has begun with the musketry of the infantry which has pushed forward its first lines in some sort as antennæ. But the greater the distance at which the combat opens the denser the veil which hides the dispositions of the enemy. It is to raise this veil that we begin the attack with artillery. The enemy's artillery in replying will betray his position and a cannonade will begin during which the assailant can make reconnoissances and take his dispositions. The great increase in the range of the pieces will therefore lead to the engagement of the whole mass of artillery very early in the struggle.

When the assailant shall have determined upon the place and the moment at which he will attack, then only can the chief of artillery, conforming to this determination, advance with the object of opening the final artillery combat at the range at which shrapnel will produce its full effect, for he should seek to bring about the desired result with his artillery at the place where the infantry decisive combat will afterward take place.

From this it results that the preliminary cannonade, beginning at a greater distance, will last longer than heretofore. The decisive action between the two artilleries will certainly not last so long, on account of the enormous execution done by the shrapnel, but it will be well to delay engaging in it to the end that the infantry, that is to say the arm which really constitutes the army, may have the time to advance and deploy so as to follow up immediately the result of the artillery action with the energetic action of the infantry, and so contribute toward securing the success gained by the artillery before the enemy's artillery may have had time to refit so as to take part again in the fight. Then the artillery will follow the infantry closely into the fight. It will support it and finally will render secure the possession of the conquered position. It will then take part in the pursuit.

I will make the general idea clearer by example.

Imagine that a strong line of our pieces of the recent model occupy the heights of Lipa (battle ground of Königgrätz). It will command the main

road as far as the heights of Dub with 50 per centum of hits and will constrain the assailant (in case he wishes to follow this route with his marching columns) to commence his preliminary cannonade from the line of heights to the west of Mzan, Dub, Ober-Cernutek, in order to turn this fire from his infantry.

On the 3d of July, 1866, the artillery of the assailant could and should advance as far as the mount of Roskos to contend with the batteries of the defender, who had advanced as far as the wood of Shalka and the neighborhood of Sadowa; and when these batteries were withdrawn to the principal position at Lipa, the distance which separated this position from the mount of Roskos was too great for the assailant's artillery, and to open fire there would have been a useless expenditure of ammunition.

At the present time an artillery combat engaged in by the grand line of artillery at Gravelotte against the position of Point-du-Jour and the farm of Moscow (2700 yards) would lead very quickly to a decision, thanks to the deadly shrapnel. This artillery duel on the 18th of August, 1870, lasted throughout the whole battle without bringing about the withdrawal of either of the two lines.

In my paper I could,—basing my opinion upon the range of our pieces,—establish the principle that the fire of artillery at a distance greater than 2500 paces was but a useless cannonade. Now, at that distance, the one or the other of the two parties will very soon have to cease firing.

Horse artillery will also be required to modify its methods when it supports cavalry. Heretofore we could admit that horse artillery, even when it began to act at the proper moment, had, while the cavalry division to which it was attached was passing from the column *en route* to the formation for action, at most but a quarter of an hour, or a half hour, in which to prelude to the attack. We drew from this the conclusion that it should fire upon the enemy's cavalry as soon as it perceived it, paying no regard to the enemy's artillery.

Now the more extended range of the artillery will cause the preliminary cannonade to last much longer. On the other hand, the terrible effect of the enemy's shrapnel fire upon our cavalry will impose upon us the absolute necessity of first paralyzing this artillery before we can be allowed to direct our fire upon the enemy's cavalry. This will naturally come about of itself if the cavalry is skilfully handled on both sides, because the inequalities of the ground with the distance which will separate the two parties will give more frequent opportunities for withdrawing the cavalry from the sight of the enemy's artillery. This will not prevent opening with at least a part of the artillery upon the enemy's cavalry as soon as it is found to be within the effective range of the pieces, for the fact must never be lost sight of that the important matter is to defeat the cavalry, and that, if this end be obtained, the enemy's artillery will fall also into our hands.

We should apply this same principle in the case of artillery acting as the auxiliary of infantry, and the artillery must carefully avoid the error of believing that, since the opening of the fight by the artillery has increased in duration and importance, it has no other final aim than the artillery duel. The final aim is and always will be to defeat the enemy's infantry. Then

the artillery and infantry should always contribute to the attainment of this object whenever an occasion offers, no matter where.

What has just been said upon the mode of employment of artillery in future brings us to speak of one of the essential points concerning this arm, that is, of the place it should occupy in the order of march. It is to be expected that troops in the offensive will be engaged in the order in which they arrive. Although artillery, mobile as it now is, can pass marching infantry by taking the trot as soon as it is to come to the front, it is essential that the distance which separates it from the head of the column (the first theatre of its action is there) shall not be so great that a long time must elapse before it can appear in sufficient force; for the infantry masses would then be obliged to remain too long under the fire of the defender before it could divert his fire from them.

The artillery must march *as far to the front as possible*. That was understood in the War of 1870-71. The reasons which rendered this course necessary then have become more numerous, more pressing, with the increase of range.

How far forward, you ask? I will not lay down definite rules, but will ask you to consider what follows.

The general in command will hasten, even more than in the past, to engage all his artillery so that, under cover of the cannonade furnished by the greatest possible number of pieces, he may begin his reconnoissance of the enemy and draw up his plan of operations. Until he shall have done this he will have needed no other troops in advance of the main body than those necessary to reconnoitre the ground or to serve as escort to this line of artillery. It can even be imagined that, up to this time, it will have been disagreeable to him to see more troops, because they will have been exposed uselessly to the enemy's fire, and because he is as yet uncertain as to whether he will not direct them by preference upon some other point.

While he will open the cannonade, for example, near Dub from the line of heights west of Mzan, Dub, Ober-Cernutek, the dispositions taken by the enemy might lead him to direct the main body of his infantry by Cernutek and Hnewcows against the right flank of the enemy, and it would be much more agreeable to him if, at the moment he makes this decision, the head of the main body of his infantry had but just reached Milowitz, than if it had already begun to deploy near Dub.

It is only upon the line of march that the infantry could at the beginning cover the first position of the artillery. The other wing, if the artillery deploys only on one side of the route, otherwise both wings, can be thinly covered by cavalry. This escort will be sufficient at first, for the enemy's position is still far distant. It will suffice if precautions be taken to avoid ambuscades.

The small effect of artillery at these great distances will lead the assailant, as soon as he has at his disposition a sufficient number of pieces, to approach the enemy to the distance required for shrapnel, even if he is not desirous of engaging at once in the decisive artillery combat.

To return to our example, the line of artillery will soon advance, either

in two échelons or with a front of all the pieces, as far as the line from Mzan to the mount of Roskos.

It will often happen, therefore, that it will be far in advance of the leading infantry, and being nearer the enemy will be exposed to very great danger. Hence, it will use prudence in making careful reconnaissance of the ground upon its front and flanks. Even with the short range of the old rifle pieces it happened that great masses of artillery were obliged to go far in advance of the most advanced infantry. Such a movement was the advance of Dresky with the corps artillery at Vionville, when he crossed the bridge of which mention has heretofore been made, while Flavigny was still held by the enemy.

The history of the war by the general staff tells us (page 704) of a similar movement executed by the whole of the corps artillery of the IX. Corps in advancing to the position between Verneville and Amanvillers at the beginning of the battle of St. Privat, a movement during which it was surprised by the enemy's infantry in ambuscade and suffered severe loss.

When, in the same battle, the Guard Corps was engaged and the first battalion of batteries advanced in échelon with the corps artillery, we were for some time over 2000 yards in advance of our infantry as it was coming up to enter the fight. On its right the artillery line rested upon the Hessian division, but its left flank, at St. Ail, was for a long time covered only by the regiment of Hussars of the Guard.

Colonel von Dresky writes what follows upon his position of August 18th. "The foolhardiness of which I was guilty at Verneville should serve as a warning in future in regard to the reconnaissance of positions. The position chosen by me was bordered on the right by a forest. Wholly absorbed in the struggle, I did not make sure of the fact that our troops occupied this forest. Later I learned that at the moment when my batteries took position the wood was still occupied by the French. How easy it would have been for them to discover me, and if they had discovered me what then would have become of the corps artillery of the III. Corps? This experience taught me that in selecting a position it is necessary always to reconnoitre covered ground on the right or left, using non-commissioned officers or trumpeters, before taking position; and to leave men there in observation until our infantry has occupied the terrain in question."

Mention should be made also of the position occupied by the artillery of the V. and XI. Corps at Sedan. At the moment when it became engaged it was so far in advance of our infantry lines that the left wing could at first only be covered by cavalry.

The more extended the sphere of action of the artillery becomes the more frequent will be these unsupported movements in advance of the assailant's artillery masses. As soon as the infantry shall have advanced in its turn to engage at shorter ranges the artillery will no longer be in danger and will then begin the decisive artillery duel.

In that one of my "Letters upon Infantry," in which I treated upon the attack in open plain, I have already given you my opinion in detail as to the manner in which artillery should support infantry after the artillery

duel; and if I enlarged upon this point here, would only repeat what I said there.

I believe I have sufficiently developed my manner of looking upon the future employment of artillery in engagements in the open field. If you add what I have heretofore given you as being the results of my experience in war to this, you can yourself formulate a system for the employment of field artillery in combination with other arms. As for me, I love neither systems, nor rules of action established in advance. I prefer what I call the "Tactics of the Moment."

From what I have said in detail upon the artillery, I will advance the following propositions.

1. *The artillery must make it its chief aim to learn to fire well,—with all that that implies.*

2. *In the manœuvres the artillery must devote all its energy to acquiring the ability to appear in masses at the exact moment when needed; that is to say, the ability to traverse at a fast gait long distances,—very long,—the length even of many German miles; and to do this whether marching in column of pieces or in battery front.*

3. *It should above all things avoid the idea that the first shot must be fired immediately upon unlimbering. It is not proper to lose time unnecessarily, but the essential thing is that the first shot should be carefully aimed, and its effect be carefully observed to the end that the exact range may be obtained.*

4. *If, as I think, the extension of the sphere of action of the artillery will have for consequence that its fire will usually be opened sooner;—if the artillery duel gains in importance and consequently in violence;—if the action of the artillery continues until the last phase of the infantry fight and even so far as to speak the last word in the pursuit;—then in future a greater quantity of ammunition will be expended by the artillery than during the last war, and arrangements must be made to prevent the supply from becoming exhausted, especially in the critical moments.*

However tiresome it may be I feel called upon to speak in detail upon this last subject.

It seems to me absolutely essential that the first échelon of caissons (three caissons and a repair wagon) should be considered as an integral part of the battery and should always follow it immediately. It is only when the captain, after having taken position, wishes to go into action then, that he gives the order for these carriages to post themselves upon a flank or in rear of the battery.

But even the carriages of the second échelon should not be too far from the battery. They should above all not be separated from it too soon, for in that case they may never again be seen throughout the whole battle. When the battalion chief shall assign the batteries to position, then, and not till then, it will be time to give the order for the carriages of the second échelons to assemble under an officer and take post at the designated place.

The regulations fix the interval between each shot for rapid fire at six or at most eight seconds. At this rate all the limbers of the battery may be

emptied in less than half an hour. You will agree, therefore, that it could easily happen that at the critical moment one might be embarrassed, that is to say might fail of ammunition, if the carriages of the first échelon have not been retained from the beginning so near the battery that, firing slowly and steadily, the shells may be taken one by one from the caissons so as not to draw upon the limbers, but to leave them complete for the rapid fire. If you begin by expending about the half of the projectiles contained in the limber chests for the slow fire, the carriages of the first échelon being at some distance from the battery (which in the course of the engagement could very well bring about an interruption of communication between them), and suddenly a crisis is produced which necessitates a rapid fire, the battery would find itself in less than a quarter of an hour out of ammunition and consequently at the mercy of the enemy.

Neither should the other échelon separate itself too soon or too far from the battery, for the renewal of exhausted ammunition might thereby be endangered and the communications might be cut by other bodies of troops. Nowadays we read in many works called "Studies," otherwise of great merit, that their authors for the simple route march, when the enemy is neither heard of or seen, assign the batteries and their second échelons to different places in the column, placing the échelons for instance at the tail of the advanced guard, or even behind the whole division. Others propose even, in the case of assignment of batteries to cantonment, in the immediate vicinity of the enemy, to station the second échelons at a different place. In view of these propositions I cannot avoid fearing that after thirteen years of peace, artificial arrangements are again coming to be considered which, if applied in war time, will have most sorrowful consequences.

Imagine the second échelons marching behind the division and consequently from two miles to four and a half miles from the batteries. Suppose the batteries to receive the order to take position at a trot and that they traverse at that gait the distances just mentioned. In a little while the second échelons may be almost nine miles from their batteries, for they will not find a battalion which will make way for them to pass. The infantry as well as the artillery will be in haste to engage and will not consent to let an "ammunition train" block the road. Probably these batteries will share my experience at Königgrätz, that is, in all the battle they will not see their caissons again.

Another thing yet. We are certain of expending more ammunition in the future than in the past. It is then probable, it is even certain, that in all obstinately contested battles the artillery must, during the course of the battle even, renew its supply of ammunition from the train. When the first shot was fired after noon at St. Privat we already had to go to the ammunition train for shell with which to keep up the fire. If a battle begins early in the morning of a summer day, we can be sure, as I have heretofore demonstrated, that the ammunition contained in the limbers and battery caissons will not suffice for the whole day. Rapid fire will exhaust this supply in two hours. Certainly we cannot imagine a rapid fire of this duration but the ordinary fire (with intervals of 15 to 20 seconds) will exhaust

it in four or five hours. Even when the batteries do not fire without interruption it will be necessary to make such arrangements that if the ammunition should be exhausted in six or eight hours the limbers and caissons can be filled again from the column. But the special duty of the carriages of the second échelon is to bring this ammunition from the trains. These follow the troops at a distance varying from four and a half miles to half a day's march and are consequently at least nine miles from the head of the column. The earliest time in which they could at a trot reach the station assigned them will be three or four hours after the combat begins. But at this moment the second échelons of the batteries must also have reached this point to be refilled, for much time is lost in transferring ammunition, bringing it to the batteries, and again transferring it. This will be impossible if the second échelons march at the end of the column of troops, for even if they do succeed in finding their batteries during the engagement and in establishing communication between them and the ammunition train, this will, even under the most favorable circumstances, require three or four hours. This is why the second échelons, marching as in war, should form an integral part of the batteries up to the time when the batteries themselves know where they are to take position. After that it may be possible to establish the position of the second échelons.

There remains for me to discuss one point which especially concerns the artillery. I have already mentioned it more than once, but I cannot pass it in silence when the occasion offers to return to it, for I hold it as very important.

In my opinion it is not permissible for a battery to withdraw simply because it has exhausted its ammunition. If this case should occur it has only to remain in line without firing. You deem this cruel—tyrannical? I agree with you, but nevertheless it must be so. At Königgrätz Captain Von der Goltz gave the order for his battery to remain under fire, and it remained there, and in 1870 this course was formally prescribed. Besides, it is wonderful to see with what rapidity a battery obtains ammunition when it is constrained to remain under fire without firing. Von der Goltz proceeded in the case cited above "by way of annexation." Sabre in hand he seized caissons which were wandering about in search of their proper batteries. And who was injured by that? The ammunition was at least used against the enemy instead of being carried here and there without being of any use. Moreover, all batteries which have opened fire will voluntarily aid a neighboring battery which is out of ammunition, and it will be for their own benefit to do so. Suppose, for instance, that a battery is out of ammunition and that the battery on its flank has yet two full caissons, that is, enough to fill completely the limber chests of its six pieces. If it give to the first one caisson, that is to say fifteen rounds per gun, it can be certain that at least for the time required to fire fifteen rounds the enemy will be fired upon by a double number of pieces. Before these fifteen rounds have been fired the supply of ammunition may perhaps be renewed. If on the contrary it does not give half its ammunition, the battery at its side can no longer take part in the action, and it will itself be exposed to the danger of being crushed by the enemy because only its six pieces will have continued

to fire. Consequently, not only the spirit of comradeship but also the instinct of personal preservation requires that neighboring batteries should be aided with ammunition when necessary. But why did not this take place with the battery of Von der Goltz at Königgrätz? Because on his right and left were posted batteries of four-pounders, while his pieces were six-pounders. This will not occur again, for we have now but a single calibre for all our field pieces, with the exception of our horse batteries, which is a great blessing.

In regard to the proportion in which artillery should be attributed to troops it seems to me desirable to give a strong artillery force to advanced guards and rear guards in order to be able to bring the artillery into vigorous action without delay. In 1870, when the First Division sent forward a brigade of infantry as advanced guard of the corps, two batteries were usually assigned to it. I believe it would not be going too far to carry the figure to three. This would certainly leave the Second Brigade with no more than a single battery, but in my opinion our divisions are given too little artillery. It would be well to give each division six batteries, which would form a regiment of two battalions of three batteries each. The corps artillery could then consist of three battalions of three batteries each. This formation would afford a practical method of passing from the Peace to the War footing, since the regiments would no longer be dislocated in view of war, but would continue to form one unit always the same.

It is true that this would lead to an augmentation of our artillery amounting to two batteries per corps.

Against an increase of the artillery the objection has heretofore been urged that the effective force of the infantry diminishes much more rapidly during war than the effective force of the artillery does, and that therefore the desired proportion between the arms soon ceases to exist. But it has always been the case that all generals commanding armies, when their infantry is inferior either in number or in moral worth, have had the tendency to give it a very strong artillery as a support, and to remedy in this way this unfortunate state of affairs.

If we consider what has been done by our neighbors it will seem decidedly advantageous to augment the artillery.

If the increase of two batteries per corps should even be insufficient, a matter which I cannot overlook, then it will be necessary to increase the strength of the battalions of the divisional regiments from three batteries each, to four.

Still another argument which has been advanced against the increase of the artillery is that it will be a great inconvenience to increase the "train" of the army.

Ah, well, my dear friend, I refuse to discuss the matter with men who, after Vionville, St. Privat and Sedan, still consider the artillery as "the train," and not as fighting troops.

When an isolated division marches with an advanced guard of but one regiment, it is hardly to be supposed that more than one battery will be attached to it. In this case it is not necessary to assign more artillery to it,

for the main body of the division will be near at hand and can send its artillery quickly to support its advanced guard.

If my advice should be followed and a regiment of six batteries be attached to each division, then a battalion of three batteries will ordinarily be sent with each detached brigade.

To detached regiments, on the other hand, not more than one battery should be attached.

The breaking up of batteries and assignment of single sections is wholly inadmissible. The reasons which I gave in support of this proposition in the conference of 1869 have only become more pressing as the range of our pieces has increased.

I gave you my opinion in regard to the horse artillery attached to the cavalry division in my Letters upon Cavalry. I demonstrated that it is not desirable to break up the artillery battalions, but that an entire battalion should be attached to each cavalry division for the whole war. All the possible reasons which can be drawn from tactics, from administration, from the organization of the Army, militate in favor of my proposition. At the time of mobilization no other arm is dislocated. No unit of but the strength of a company or a troop is detached. We should still less do this with an arm which is so difficult to direct, which has such difficult tasks to perform.

The former principle that horse artillery should avoid engaging in an artillery combat is no longer tenable.

In 1870 the horse batteries assigned to the corps artillery took an important part in artillery combats because they were able to go into action sooner than the others (see what von Dresky says upon the battle of Vionville). The horse batteries of the cavalry division took part also as soon as it devolved upon them to open the battle (Vionville, St. Privat, Sedan).

During a battle the cavalry division has no need of horse artillery, for it attacks only after the artillery and infantry have prepared the way. It only needs it when acting independently.

The Guard Corps attached a battalion of horse artillery to its cavalry division only when it was detached to go in the advance, but as soon as the battle opened this battalion returned to the corps artillery.

The more accurately the artillery fires the more important it is to bring into action a greater number of pieces than the enemy has, the more also it would be a mistaken idea to deprive the artillery firing line of the pieces belonging to the cavalry division by leaving them inactive until the time comes for the cavalry to make its attack.

In your reply to my last letter upon cavalry you raise the objection that to assign a whole battalion of artillery to a cavalry division would render it unmanageable, would attach a weight to its feet. In theory your objection is perfectly just but it is no longer so in practice. Three pounds are heavier than two, and therefore three batteries should be heavier than two. Yet this reasoning is not correct, for three batteries can trot just as fast as two. A cavalry division detached to act independently has many other weights to drag along—many other obstacles to its flight, such as ambulance and subsistence columns. Taking the whole weight into account that added

by one battery disappears. It is only necessary to hold the battalion well together to observe the principle that it should only be employed in mass, and then it will be wholly indifferent, as regards the mobility of the cavalry, whether it has one, two, or three batteries attached to it. But as to the vigor with which it will sustain an action, that is not an indifferent matter.

During the War no division had too much artillery with three batteries; it is the contrary which was true. Did not General von Voigts-Rhetz immediately increase the horse artillery of the fifth cavalry division to four batteries, with which Major von Körber at Vionville surprised the French camps? It is only in time of peace that there is too much of it, when we do not know what to do with it.

We must guard against dispersing the batteries by assigning them to brigades.

Brigades are not organized with a view to independent action and rarely act independently. When as an exception, the case does present itself, then a battery can be attached, but the rule should none the less be established, that the entire battalion should always be employed as if it were a single battery. Even when a cavalry division sends forward a brigade as an advanced guard, I would not ordinarily attach a battery to it. The brigade of light cavalry has usually no other mission than to observe what passes, to disturb the enemy or populations, to appear, and to disappear immediately. When this is its task, artillery may easily be an impediment to it. But if it is to fight, then a battery should be attached to it. The question as to which it is to do, will be decided by the news received of the enemy's movements, the terrain, and the object which it is to attain. If a brigade be sent out without artillery, and the situation changes so that the object to be accomplished by the brigade changes, a battery can be sent to join it. It is thus that we proceed in war. The cavalry division of the guard at first sent out the dragoon brigade without artillery. When it approached the Moselle and it might happen that it would have to take or defend defiles, a battery was sent to it.

As for me, I think the case may easily arise when the whole battalion belonging to the division may be momentarily detached to join the advanced guard. If, for example, a locality or defile is barred by an infantry detachment relatively weak, supported by some few pieces of artillery, and it is important that the enemy should be quickly dislodged, it is preferable to bring rapidly into action an artillery force superior in number, rather than to dismount the light cavalry to engage in a dismounted combat in which it would be exposed to considerable loss.

In the case in which a division is required to cover or to reconnoitre two roads, it would doubtless send forward on each a light brigade or a regiment and follow with one or two brigades in rear of the centre. To these should be attached a battalion of horse artillery, which would be sent to the front as a whole at the moment only when it is required to overcome the resistance offered by the enemy.

The same for three roads. In this case only a single regiment would doubtless be sent forward on each road. The main body, composed of at

least a brigade of heavy cavalry, will follow, and the battalion of horse artillery will march with it.

The same principles should be followed when a brigade of cavalry is detached. The aim assigned it will decide whether or not a horse battery should go with it.

The greater the range and accuracy of the artillery the more easy it will be to indicate the manner in which horse artillery will conduct itself in an action where it supports its own or opposes the enemy's cavalry. As a general rule, it will occupy but one position until the moment when the cavalry combat shall have decided, and this position should be as near the enemy's artillery as the configuration of the ground will permit. From thence it will silence this artillery in a duel of which the duration should be as short as possible. From this same position it will then usually attack the enemy's cavalry.

But it has become very much more difficult to reconnoitre and occupy this position at the opportune moment. For this reason artillery should be commanded by a superior officer who will remain near the division commander until the moment when he should lead his batteries into position. He must not be required to occupy himself with the affairs of detail in his batteries, but simply to keep himself thoroughly informed as to the intentions of the general commanding the division.

When the artillery has once opened fire the general will usually take post on its flank, for from the elevated position it will occupy he can best give his orders. The chief of artillery will then be near him, and will be separated from him only at the moment when the division commander goes in person with his last reserves to take part in the action. Then the critical moment comes for the artillery commander, for he must decide whether he will follow the general to assure the victory, or remain where he is, so that in case of defeat he can arrest and drive back with his fire the pursuing enemy and indicate to his own cavalry a point where it may rally.

The question of a special escort for the artillery remains to be considered.

You know I am an enemy to any permanent special escort.

Generally the artillery should be posted so that the troops formed for combat shall cover it. But, as ordinarily a battalion of horse artillery will be posted upon one of the wings of the division and will open its fire there, it is a necessity that the exterior wing should be covered. If the artillery position be well chosen it will be but little menaced on this exterior wing. It will suffice to protect it that a platoon of cavalry be sent there with orders to send videttes out far enough to render a surprise an impossibility. To take from the cavalry division a special escort strong enough to engage in combat will be to deprive it of too much of its strength, the absence of which will be felt in the final struggle.

THE SMOKELESS POWDER.

By CAPTAIN J. CASTNER, GERMAN ARMY.

Translated by Captain MAX WESENDORFF, First Cavalry.

IT was in the year 1846 that news spread of a preparation for shooting purposes, neither making the usual report nor producing smoke, which created quite a sensation in interested circles. Boettcher at Frankfurt and Schoenbein at Basel, had independently discovered gun-cotton at the same time. The new invention was seized upon everywhere with high-strung expectations, and even the German Diet at Frankfurt attached it to so great an importance that it charged a special commission with its examination. The new explosive which, since the beginning of more extended experiments in Austria, had been given the name of gun-cotton,—did away with two faults of common gunpowder—the annoying smoke, and the not less annoying residuum in the barrel of the weapon. Yet a gun-cotton, as the name promised, that is an explosive which in shooting from fire-arms could replace gunpowder, was not obtained, in spite of arduous experiments continued through years; though the result was nevertheless an excellent material for blasting purposes which is very highly valued by the artillery of to-day for charging hollow shot.

Thirty years ago the time was not yet ripe to invent a new gunpowder in the sense of our present day, nor to apply it. Chemistry had not then made clear the nature of explosives. The instruments for measuring the pressure of gases within fire-arms had not been invented, nor the metres of to-day, by which the velocity of flying projectiles can be determined, nor yet the weapons which necessitated a powder of different effect from the old black powder. While the question of a suitable powder for the heavier guns began to be agitated when the necessity arose to meet iron-clad ships; the need of a new powder for the lighter fire-arms did not arise until it was recognized, that a repeating rifle of small calibre was the fire-arm of the future. But besides technical difficulties in the way of the adoption of small calibre arms, there was also the want of a suitable powder, which, besides being less objectionable, should have more power and take up less room, than the old black powder. Aside from this, some desired and others demanded as further good qualities the greatest possible consumption of smoke, and in connection with this, less residuum in the weapon. It was said quite correctly that in quick fire from single barrelled guns it must be expected that lines of sharp-shooters with repeating rifles and using the old powder, would soon be enveloped in impenetrable clouds of smoke, so that aimed firing could no longer be thought of.

The demands made upon the new powder were, as a close examination showed, seemingly contradictory—great power and small internal pressure with slow combustion. How were these contrasts to be reconciled? The small development of smoke, however, seemed not impossible to the science of chemistry, which meanwhile had developed in extraordinary pace. It

was known that the nitrate-cellulose treated with nitric and sulphuric acid, by adding bodies rich in oxygen produce explosives at whose combustion all carbon burns to carbonic acid or oxide of carbon, a consumption of smoke entirely sufficient for practical purposes.

Now commenced a wonderful rivalry among the chemists, manufacturers of explosives, and fire-arms! The military commissions for examining into the merits of weapons were overwhelmed with inventions, and when General Boulanger commenced his political career at the head of the French Army, the inventors of explosives had found the most favorable fostering soil. "Melinite,"* a nitro-carbon and collodion, was invented, and heated the heads of the French in a manner agreeable to the minister of war. Quickly he introduced the repeating rifle of eight millimeter calibre, in which he used in great haste a nitro-carbon powder. Soon its uselessness, due to chemical inconsistency, was shown, and compelled, for the time being, a falling back upon the old powder. Then the powder-engineer Vieille succeeded in producing a smokeless powder of excellent qualities, whose principal component is said to be gun-cotton. Gun-cotton then has become after forty years what its name indicates.

This powder, according to French reports, is as equally well suited to small calibre fire-arms as to guns. The French have, indeed, so far succeeded in preserving the secret of the composition and manufacture of this powder, thanks to their effective espionage law. The characteristics credited to this explosive, *i. e.*, great force with small pressure of gas, and little residuum, with freedom from smoke and noise, called forth an immense excitement in all armies, especially with regard to the two latter qualities. These two qualities place us indeed at the beginning of an entirely new mode of warfare. If it be considered that the smoke from the powder enveloping the firing troops, while indeed giving them cover against the enemy's observations, at the same time prevents their aiming and observing the effect of their own fire, then it becomes clear that an unobstructed vision must greatly increase the effect of firing, especially of the artillery, at the great distances which rule in the beginning of the action. This advantage agrees with the rules of tactics for infantry and field artillery, according to which considerations for cover must always be secondary to those for the effects of fire. Indeed, we may expect that the great distances in fire action, forced by the long range arms of to-day, with undiminished sureness of aim, will yet experience a further widening to weaken the effect of the enemy's fire.

But over against these one-sided advantages there are very great disadvantages. It has been found at the more recent manœuvres, to the terror of the leaders of all military bodies, that the firing lines of the enemy can no longer be recognized or found with the naked eye at a distance of but a few hundred yards. From this it follows that a troop may suffer great losses by the enemy's fire without knowing where this fire comes from and in which direction they must send their own fire in return. For the clouds of smoke which hitherto have marked the position of the enemy, are no

* Melinite is generally believed to be a mixture of fused picric acid, in granules, with collodion gun-cotton.—J. C. B., Ed.

longer a guide with the new powder. And if it should turn out, besides, that the report of the shots, too, is much smaller than formerly, then the enemy covered at close distances behind hedges, would not even betray itself by the report of their shots. It is indeed a most uncomfortable way of fighting, and it can be easily understood how in the first manœuvres with the smokeless powder the firing could produce so dismal a mood among the troops engaged, that it awakened the desire in all to retain the old gunpowder. But how will the scene of action appear when the artillery, too, will open their fire with the smokeless powder from a distance of 4000 or 5000 yards? As neither the smoke of their own guns, nor that of firing in their front obstructs their aim or observation of the effects of their fire, they can have annihilated a troop before the latter can be positive from whence they are fired upon. In addition, the artillery will not fail in future to charge their shells with an explosive which produces the densest and blackest smoke possible in order to better observe the effects in the unobstructed position of the enemy by the clouds of smoke standing out against the surrounding background.

But of all military bodies it is the cavalry who will find it hardest to part with the old powder, and who will justly wish itself back in the "good old time." For their most faithful ally, their dearest friend was the powder smoke, which hid their attacks and prevented the attacked infantry from aiming. While the smoke not unfrequently gave them the opportunity for an unseen and surprising attack. They will in future hardly have such chances to cover their compact masses against the distant effects of the enemy's artillery fire, but will find themselves pushed more to the rear of the battle-field, unless the surrounding country should offer natural cover close by.

Should what is asserted by French technical papers prove true besides, that their smokeless powder makes but a very light sharp noise in the discharge, then the uncomfortable aspect of the fight must be yet more increased. It is a well-confirmed experience that the din of the battle, the thunder of the cannons, acts, as it were, to steady the nerves, and it is well known that timid people, not yet used to the fight, are wont to "shoot themselves courage."

Considering all in all, it cannot be doubtful, that we are approaching a new epoch in the mode of warfare, in which intelligence, discipline in general as well as in fire will, in yet higher measure than now, be decisive. How the actual battle will be in reality, we must leave to future experiences. To retain the use of the old gunpowder cannot longer be thought of as matters lie at present. Germany will not dare to do so, since France has taken the lead in introducing a smokeless powder. The prospect of success in a future combat *he* secures to himself, who most quickly learns to recognize and control the new conditions of warfare, resulting from the use of the smokeless powder.

MOUNTAIN ARTILLERY IN EUROPEAN ARMIES.

Translated from the French of Captain BORDENHORST.

By FIRST LIEUTENANT C. D. PARKHURST, FOURTH ARTILLERY.

(Continued from No. 45.)

II.

ENGLISH MOUNTAIN ARTILLERY.

THE order of battle of the English Continental Army upon a peace footing does not comprise mountain artillery properly called. However the formation of the batteries is ordered, in case of war, and it is all prepared during peace. The material, the ammunition, the saddles, etc., are kept in store in depot, in such a manner that the formation of the batteries can be made, in case of need, by the garrison artillery, with all the rapidity and facility desirable.

The order of battle of the Indian army upon a peace footing does comprise, on the contrary, four mountain batteries of 7-pounders for the Bengal army, and two for the Bombay army.

All the English mountain batteries, whether in Europe or in India, are armed with 7-pounder guns of cast steel and muzzle loaders. The guns are jointed and are made after the Armstrong system. They were first used in the campaign in Afghanistan, and behaved well there. * * *

A. The Gun.—The guns of the latest model of the English mountain artillery are of steel and are composed of the chase, the middle part, and the breech. The chase has a conical form and has at its base an annular enlargement, which serves as a support to the middle piece. On the interior of the base is a conical groove, in which fits the front end of the breech.

The breech has on its exterior surface five screw threads at the front end, and a knob at its rear end.

The middle piece consists of an annular cylinder which abuts against the annular enlargement of the chase, and which is threaded upon a part of its interior surface so as to be screwed upon the breech.

To put the gun together the breech is placed vertically, then the chase is put in place and the ring is screwed up, which is done by forcing, by giving blows with a mallet upon one of the trunnions, which is surrounded by a sleeve to protect it. This operation is very easy and only requires from 35 to 40 seconds.

To take the gun apart the operation is performed by inverse means, and only requires 25 seconds.

With respect to its external form, the English jointed gun has the same general characteristics as muzzle loaders. Internally it comprises the rifled bore, the smooth stricture or contracture in front of the chamber, and the smooth chamber. The vent is screwed into the gun perpendicular to the axis, and opens at the middle part of the length of the chamber. This latter has a greater diameter than the bore, and is joined to the diameter of

the constricture by a curved surface forming an annular projectile against which the projectile abuts. * * *

The English mountain gun weighs 181.4 kil. The 'chase (with the sleeve) and the breech have the same weight, *i.e.*, 90.7 kil.

B. The Carriage.—The mountain artillery carriage is of plate steel, and is constructed after the Englehardt system.

The carriage is composed of flasks in plate steel, bound together by a head plate, cross plates and bolts. The flasks have, on their upper part, bands for trunnion beds, and underneath grooved bands for the axle seats.

The axle is of quadrangular prismatic form and can advance or retire in its seat. It is not bound to the carriage in a fixed position. The connection is made by three iron buffers and three steel spiral springs. The buffers are fixed to the axle and pass through the cross-plate which supports the springs. Upon the buffers the springs are placed. * * *

The elevating apparatus is a toothed arc and wheel. * * *

The wheels are of wood with metallic hub. For transportation the carriage is taken apart. The body of the carriage forms the load for one mule, the wheels the load for a second, and the axle with the springs and the elevating apparatus that of a third.

C. Ammunition.—The mountain artillery ammunition consists of shell, shrapnel and case shot.

The firing charges are composed of floss silk sacks containing 680 gr. of course grained powder.

The initial velocity of the projectiles is 438 m. * * *

D. Transportation of guns, etc.—The English mountain guns are transported by the aid of pack animals, of whom 2 are required for the gun, 3 for the carriage, 6 for the ammunition and 7 for the implements, accessories, rations, etc.; one animal carries the chase and the middle part of the gun lengthwise of the animal, the muzzle to the rear, weight, 90.7 kil.; a second, carries the breech, whose threaded part is protected by one annular ring, weight, 90.7 kil.; a third, the body of the gun carriage, weight, 80.3 kil.; a fourth, the axle, the elevating apparatus, and the axle case, weight, 107.5 kil.; a fifth the wheels, weight, 89.3 kil.

E. Organization.—Effective strength of a battery upon a war footing, comprises 7 officers, 195 men, 24 horses and 110 pack animals, guns of 7 cm. 6, saddles 18, pack saddles 103.

The English Army has, in time peace, in India, 6 mountain batteries, 4 for the Bengal army, 2 for that of Bombay.

The Bengal batteries have each in time of peace, 4 guns, and on war footing, 6 guns, and an effective of 5 officers, 173 men.

The batteries of the Bombay army have always, in time of war or in time of peace, each 6 guns and an effective of 6 officers, and 228 men.

Each battery therefore carries with it 600 rounds.

RUSSIAN MOUNTAIN ARTILLERY.

The bronze 3-pounder breech-loaders were introduced in the Russian artillery in 1867, to serve as mountain guns; Russia then was the first to introduce breech-loaders into her mountain artillery.

After the introduction of the field guns in 1887, a new gun was thought of for the mountain artillery. To this end experiments were made simultaneously with a Krupp model of 63 mm. 5 (2½ inches) and a gun of the same calibre proposed by Baranowsky, the constructor of the 3-pounder guns of 1867. The result of these experiments was the adoption of the steel gun of Baranowsky.

Among the carriages, choice was made of the jointed carriage proposed by Krell, which was not definitely adopted until after numerous modifications proposed by the committee on artillery.

Hardly had the extension of the construction of this material begun when the idea of jointed guns sprang up, which attracted the attention of the Russian technician. The armament of the batteries with the Baranowsky guns was stopped for some time, and experiments were begun with jointed guns of the Krupp and Obuchow systems, experiments which have not yet ended (1884) with positively satisfactory results.

At the end of 1882 all the Russian mountain batteries, with the exception of Battery No. 5 of the 3d Artillery Brigade, were armed with 3-pounder bronze guns, m. 1867. The above-mentioned battery had steel guns of the Baranowsky system.

We will give the description of those guns:

A. 3-pounder Russian mountain guns, breech loaders, m. 1867.

A. The Gun.—This gun is made of bronze and has the form externally of a single cone, terminated at the breech by a squared part, intended to receive the breech mechanism. The trunnions, whose axis intersects that of the gun, has square rim bases. Upon the chase and near the muzzle two hooks are found by which the tompion is fastened. Upon the right rim base is found the front sight, and upon the right of the breech the seat for the hausse. A bronze plate protects the loading orifice of the breech mechanism. Finally, upon the left side of the seat of the breech block a small groove opens, intended to receive the stop-pin of the breech block.

The rear part of the chamber has an enlargement of a particular form to receive the steel ring and the copper trimming. The external diameter of this ring being from 0.5 to 0.8 mm. greater than its seat in the chamber, a certain pressure is necessary to fix it there. This ring, whose interior is slightly conical, penetrates from 1.5 to 2 mm. into the seat of the breech block to assure its contact with the Broadwell ring of the supporting plate of the breech block and thus obtain a positive obturation.

The Broadwell ring is lodged in a place hollowed out of the supporting plate, and its plane surface is supported, as in the Italian mountain gun, when the breech is closed against the steel obturating ring which projects beyond the front surface of the seat of the breech block. It is then that the obturation is obtained during the firing. The winch handle is fixed upon the square part of the formature screw by means of a pin.

The other dispositions and the handling of the breech mechanism are similar to those of the Austrian mountain guns of 7 c.m., m. 1875,

B. The Carriage.—The 3-pounder mountain carriages are composed of two parallel mountain flasks in plate iron, reinforced from the trunnion beds up to the head by a fixed plate, and upon all other sides by riveted

angle irons. The trail is consolidated by a riveted plate under the corners, and which forms a shoe to prevent the end of the trail from sinking into the ground. The axle seat has reinforcements upon each flask, both externally and internally. The two flasks are bound together by three cross bolts. That at the head of the carriage serves also as a support to the two branches of the elevating fork.

The iron axle has a square cross section. The arms are a little enlarged where they pass through their two seats, to prevent lateral displacement. The axle is kept in its seat by two bridles riveted to the corners. Between the two flasks are placed, the one above the other, two cross plates, each pierced to give passage to the working pin of the shaft attachment. The upper cross piece is terminated by two hooks intended to receive the braking cords.

The wheels are of wood, with wooden hub, iron tire, six felloes and twelve spokes. Upon the hub is fixed a hook in which the braking cord engages.

The shaft attachment for the 3-pounder guns is composed of three parts that can be taken to pieces for transportation, viz.: the crossbar and the two shafts. The crossbar is terminated at its extremities by two iron sockets in which the shafts engage. At the middle part, and on top of the crossbar is fixed the working pin, by which attachment is made to the carriage. Underneath is fixed an iron fork whose extremities have sockets also, through which the shafts pass.

Screw eyes, fastening clasps, and keys serve for the loading of the different parts upon the pack-saddle and the hitching up of the shafts.

C. Ammunition.—The ammunition of the 3-pounder mountain guns consist of shells, shrapnels, case shot, cartridges, friction primers and signal rockets. * * * The shell adjusted weighs 3.99 kil., of which 1.53.6 gr. is for the explosive charge, 205 for the fuse, and 1.381 kil. for the lead sleeve.

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D. Implements and Accessories.—The implements and the accessories of the 3-pounder mountain guns are generally the same as those in use in the artillery of other countries.

The ammunition cases are of wood. The cover and sides are reinforced by iron bands. The ends have handles, and on the bottom of the box are two iron rings at the back part, with one in front. The first two serve to fasten the case to the pack-saddle, the one in front is intended to fasten the two cases together, underneath the belly of the pack animal (by a lashing) to prevent, as much as possible, all swaying during the march.

The covers, being hinges, the fastening is by means of a hasp and key. The hinges have, on their upper part, a cover which prevents the entrance of rain.

The interior of these cases is divided into three compartments, and carries 6 shell, or shrapnel, the corresponding charges, a case shot, with charge, the friction primer, and finally, some implements for the gun.

E. Transportation of the Russian Mountain Guns.—The material of the foot mountain batteries is principally carried on the backs of animals,

while that of the horse mountain batteries is hitched with horses and escorted by horsemen. When the road to be gone over is not long, or when a change of position is all that is required, the carriage with its gun can be transported exceptionally by way to traction by means of the shaft attachment.

For the 3-pounder bronze mountain guns one horse carries the gun, another the body of the carriage and the axle, and a third the wheels and the shafts. In the case of the jointed carriage a fourth carries the trail and the cross-piece of the shafts. The ammunition boxes are carried two upon each animal.

The pack saddles of the Russian mountain artillery have, in principle, the same construction, and are composed of two arches bound together by the side bars by buckles and clasps of iron. They have on the interior a cushion formed in two parts, which is applied upon the horse by the aid of the girth and the horse cover. The breast piece and the crupper prevent the saddle from slipping backwards or forwards. The horse that carries the wheels has besides a small collar, to which are attached upon each side the shafts by means of a ring. The carriage carrier is provided with a breast collar joined to two traces. To move the piece the shafts are attached to the carriage, the wheel carrier is hitched between the shafts and the carriage carrier is hitched in front. The pack saddles have special dispositions, which vary with the nature of the load.

The gun saddle is surmounted by a small carriage composed of two parallel supporting flasks and two cross-pieces, and these flasks have two beds to receive the trunnions. The gun is placed lengthwise of the horse, the chase to the rear, and is fixed in place by straps.

The pommel and cantle of the carriage saddle have, on their upper part, rectangular places in which the flasks adapt themselves. The carriage saddle has besides two rings upon each side, in which both are placed which go through rings fixed upon the flasks of the carriage.

The saddle for the wheels carries iron axles to receive the wheels; places hollowed out in the pommel and cantle permit the placing above of the cross-piece of the shafts. The two branches of the fork are fixed to the felloes by straps. The two wheels are bound together above and under the horse's belly by straps. The shafts are fixed on each side below the wheels, and are fastened to the felloes.

The material of the horse mountain batteries is ordinarily hauled and each piece arranged with a limber and caisson. The limber is dismountable. The draft consists of four horses. The caisson is formed also of an axle, two wheels and a double sheet iron box that can contain four cases of mountain ammunition. It is drawn by three horses abreast.

If the country is very mountainous the material of the horse mountain batteries is carried exceptionally upon pack animals. The guns and the caissons are then dismounted and loaded upon the fifty-six draft horses, and upon a part of the saddle horses. It is for this reason that the former with the exception of the reserve horses are provided with a pack saddle. As to the latter, the saddle is arranged in such a manner as to carry implements, etc.

"DEFENSE OF VILLAGES AND STREET FIGHTING."

BY THE LATE MAJOR-GENERAL C. B. BRACKENBURY.

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THE study of street fighting may at first sight appear a small and unimportant business. It has certainly been rather neglected in our Army; but all things have their times and seasons. Not long ago, all minor tactics were neglected, yet now I suppose there is not one among you who does not know pretty well how to conduct a company in most of the minor operations of war, so far as work in the open field is concerned. It happened to me once to be on the Umpire Staff at the manœuvres near Salisbury, and on a particular occasion I was riding with a brigade when an order was brought to the officer in command that he was to carry a certain village which prevented the passage of a river. His reply to the messenger was "How am I to do it?" Well, that seemed a rather curious question for a general to ask, but it is pretty clear that we must learn as junior officers what we have to practice as generals, and, what is more, the fighting of to-day gives more importance than used to be the case to the younger officers fresh from the playing fields of public schools, among which we may fairly place Sandhurst and Woolwich.

Only two years ago last spring there were some volunteer manœuvres at which some of you may possibly have been present. The portion of troops which I had the honor to command consisted of a so-called division, which was in first line and had to defend a terribly long frontage. In that line were two villages, or rather a village and a hamlet, supposed to be placed in a condition of defense. One of my two brigades occupied the village, and behind it was another brigade under separate command acting as reserve. My second brigade held the hamlet with a battalion and covered as well the right flank of the line. The enemy as I had expected attacked the village principally and the hamlet partially, indeed we had information of his movements from the beginning. One reserve brigade was brought close to the back of the village, the original flank brigade being then ordered to be ready to make a flank attack on the enemy when engaged in his assault on the village. To my astonishment the umpires seemed to think that a defended village was hardly any obstacle at all to the movements of troops, and I verily believe they would have allowed an enemy little superior in strength to the defenders to walk through that village as a knife cuts through a cheese, but that the commander-in-chief saw the confusion already prevalent in the ranks of the attack, and checked the pace at which the advance was being permitted. Here then are two examples of the need for a little more study of what it means to penetrate through streets which are defended, to say nothing of getting over the difficulty of entering the place at all. I had already a book in hand which treated on the subject, and you will not be surprised to hear that a considerable impetus was given to the work by observing what occurred at Dover.

Street fighting must be much of the same character whether it occurs in a fortified town taken by assault, as in that remarkable instance at Saragossa in 1809, and in Paris under the Commune in 1871; or whether it forms part of the numerous attacks and defenses of villages which are common in every war fought in countries where the villages and hamlets are well and strongly built. Hardly anything of the sort occurred in the Russo-Turkish War of 1877-78, partly because the villages there were mere hovels, quite indefensible, and partly because, for reasons touching upon their national character, the Turks when beaten seemed to acknowledge the hand of Allah and did not strive to delay the Russian march. There might have been a struggle of that sort inside Plevna but that, as you know, it was at last abandoned by the Turks, who endeavored to break through the Russian lines and had to lay down their arms outside the place. To defend a town step by step exposes the civil population to the horrors of war. The peculiarity of Saragossa was that the inhabitants, men, women and children, were so filled with the spirit of patriotism that they were ready to face any dangers and miseries rather than to yield, and the town was defended by a man fitted by nature to make use of that ardent enthusiasm which prevailed. I have often thought of what might take place in London under such circumstances, and come to the conclusion that no army which could be landed on our shores could possibly overcome the resistance of its millions if they had the heart to behave like the people of Saragossa. There is no example in history of the struggle of a free people to defend a great city street by street. Even the case of Paris in the Commune was that of a comparatively small body of armed insurrectionists surrounded by a civil population which hoped for the success of the troops advancing from outside. But war is not played out yet, and it may be given to some of you to witness the horrible but inspiring spectacle of a great city defending its freedom in the streets and houses step by step, panting with anguish, yet finally swallowing up and consuming the enemy by its very vastness.

In speaking of details it will simplify matters if we suppose the case of a strongly built village or small town on which sufficient time has been spent to make it moderately fireproof and generally defensible. Such suppositions are like diagrams; they may or may not clearly approximate to any particular case with which we may hereafter have to deal, but we must assume a peg of some sort to hang our principles upon, and let me entreat the young officers who have all their military career before them to fill their heads with principles rather than diagrammatic cobwebs. Some details which are universal they must learn, but if they are worth anything they will be able to invent many details for themselves if once their brains are imbued with true principles, and if they will keep their minds supple, taking care not to crystallize into mere formalists. For this reason you see no diagram before you, simply because I am going to ask you to construct your own mental image, not a plan on paper, but the interior of any village, or concentrated essence of villages and small towns, just as your mind directs you.

This mental picture should consist of a main street along a principal road which you wish to close to the enemy. Parallel to it are two or three side streets ending in the usual minor roads which generally debouch on

such a place for the use of the farmers and gentry of the neighborhood, and across the whole will be other small streets some of which end in roads, others are only for the purpose of getting about easily among the houses. We will suppose these various streets partly straight, partly bending out of the straight. As the place lies principally on one main road, it is sure to be somewhat longer on that road than it is broad across it. Not far from the centre is a good solid church with a walled enclosure, and here and there are dotted about other specially solid buildings such as townhall, or the houses of what they call "warm men," precisely the spots where the warmest work will probably occur in war.

Our subject is not the defense of localities in general, and it matters not therefore an atom in what class the place to be defended is considered to be, whether isolated or in front or flank of a line of battle. Neither does it matter how the external attack and defense have been carried on. It is sufficient that the attack has succeeded so far that the assailants have seized at least one entrance to the place and that the defenders are ordered to hold fast as long as possible so as to deny the use of the roads to the attack. But the early preparation and the disposition of troops has been made with a view to this dogged interior defense, and we must therefore go back a little to the principles on which the preparations have been made.

Why has the village been prepared at all instead of throwing up works in the open country near the road? For several reasons. Some such small town or village is almost sure to occur, in civilized countries at any rate, just where important roads meet or there are bridges over rivers; for these and similar reasons the attackers want free passage there, and the defenders desire to refuse it. Then it is to be remembered that houses are absolutely impervious to infantry fire, and though artillery can set fire to them if unprepared, it may bombard for some time without killing more than two men and a boy, provided the garrison takes care not to expose itself in the outer rooms of the houses fronting the guns; in short, villages are an excellent shelter from fire even at the beginning, and every hour's work improves them, while earthworks are of hardly any use till they are finished. And what are we to say of shelter from the weather? Some of you perhaps know what it is to campaign without tents as all armies will have to do; for to carry such luxuries is to hamper their movements. All the experts in such campaigns will agree that the one thing they longed for in an ordinary climate was a roof over their heads at night or in wet weather. It is an old maxim that the worst house cover is better than the best bivouac, and campaigning is generally carried out in damper climates than that of an Egyptian desert. A village or town becomes a sort of home for its defenders, while of all the dreary, unwholesome, miserable holes to live in, an earthwork, even with field casemates, is about the worst.

Thus it is certain that villages will be quite as much used in the future as in the past, and the more so as the necessity for cover increases. The chief disadvantage urged by the more pedantic schools is that the commander cannot keep his eye on all his men in street and house fighting. Granted. But can he do so in wood fighting, or

indeed in any sort of attack nowadays, including counter-attack? Of course we all want to do it as long as possible, and to that end we had better recognize the facts of modern war and train all, down to the private soldier, to act reasonably under the original impulse given from the commander, even if complete separation has taken place and men are left to their own resources. Acting on this principle, the wise commander will try to delegate his powers so judiciously that his original instructions will be in as many minds as possible, filtering downwards through a proper medium of responsibility. This is easier to do in defense than attack, though possible for both. In our particular case the best way is to divide the defense into sections, entrusting each section to a head of its own, who should make his own arrangements, watched over at first and criticised by the commander, but afterwards to be carried out as independently as possible. Even if the village is only to be lightly held and evacuated on serious attack, the commander will still have the best hold on the situation by delegating responsibility, that is to say, explaining the situation to his subordinates, telling them what, on the whole, they are expected to do and then leaving the details to them. The long and the short of it is that if the commander does not act in this way he will find himself, soon after an action of any sort has begun, like a hen with a brood of ducklings, standing at the edge and clucking in vain to them afloat out of reach. It is important that so far as possible each section should be defended by a definite unit under its own officers. As for the size and shape of the sections they must come as they can. The ideal would be a portion of the exterior line of defense with its gardens, walls, abattis, and so on for one side, and the other two sides retiring gradually to meet each other at a point towards the centre of the village, ending at a street corner. Each officer would distribute his own men and form a small rallying keep for his own section. The village itself would have a keep for the whole, namely, the strongest house, often the church, which commands some of the most important approaches. The inner reserve will hold this keep and such of the streets as are not included within any of the sections. This seems to me by far the best provision against the enveloping attack which is sure to be the method employed in assaulting a village or town. Even so large a place as Kars was enveloped in this manner when the Russians captured it and its defenses in one night.

Besides the inner reserve, every place not a fortress should have an outer reserve, the main business of which is to make counter-attacks. In some cases the outer reserve will be a portion of an army, but we shall only confuse the question if we go into all that. At any rate there ought to be an outer reserve, and in all fighting of the character which we are supposing that reserve is one of the most important features of the defense. The principle on which all the villages round Paris were held during the investment was to have a comparatively light garrison which gained time when attacked by a steady defense till reinforcements came up and fresh troops drove back the French already weary with their great efforts. These troops acted as an outer reserve. Supposing the village isolated, as a general rule you will have at the beginning a shooting line outside, which,

including supports, will be about in the proportion of one man per yard; an equal number for the garrison, including inner reserve, and again another third for the outer reserve.

It must be taken for granted that you are all familiar with the method of preparing a house for defense, and not obliged to sit down and cry for an engineer if such work had to be done. You know how to provide against the danger of fire, and also, no doubt, in a village, that there should be spaces made here and there, if possible, so that the attackers should find themselves pulled up by an exposed opening, on the other side of which are defenders prepared to dispute the passage from fortified houses not yet touched by artillery fire. You know also how important it is to have communications arranged, not by the regular streets, so that they may be better known to the defenders' troops, who can place sentry guides here and there, than to the attackers fresh from the outside.

There is a much debated question whether the defenders should have guns inside a village or small town. I hope nobody will accuse me of underrating field artillery as a rule, but in this case guns seem to me out of place. The value of anything at a given moment may be great, yet it may not be worth having during the whole of a fight in anticipation of that moment alone. Such I take to be the case with guns in street fighting and machine guns in the open field; whereas machine guns in street fighting, provided they are light enough, and field guns in the open field, are universally efficacious. There are no doubt possible cases where guns may be used, for instance, if the main street be long and wide, and if the attacking party have made a barricade at the end they have carried, or utilized one captured from the defenders. Even then it is plain that the affair is proceeding slowly, and there will be time to send out for the pieces, which might be in possession of the exterior reserve. If the attack is able to be pushed rapidly your guns will probably be of no use at all and soon be captured.

With regard to the erection of barricades, these most useful and necessary means of defense must not be so multiplied by the defenders as to become an embarrassment to themselves. It is a good plan to decide on the best spots for them, and collect materials there, but not build more than are necessary at first, so that free circulation may be possible for the defenders. Whatever the kind of barricade, it should invariably leave room for troops to pass round one or both ends. The great principle to remember in using barricades is that applicable to all field works, namely, that they are not intended to be obstacles to an enemy's progress if he reaches them, but rather as cover from which the defenders can fire against an enemy in the open street. The same treatment which the main street requires should be applied to the cross streets and all others, for an attacking force which knows its business will most certainly try to envelop the place and attack it on three sides at once, even if that force be not strong enough to expect to succeed in all directions. Success in any fight is not produced so much by the number of men killed on the opposite side as by the moral effect produced on the remainder, and soldiers who may feel very bold against an enemy in front of them may often give up the game when the sound of firing tells that he is on the flanks as well. Yet, in

street fighting, though the enemy be even on three sides at once, he is not able to fire through the blocks of houses, and may be driven out after all, especially if well judged counter-attacks are made by the exterior reserve. The defenders ought not to retire merely because they are outflanked, but it is extremely likely that they will, unless they have had some training in street fighting, and I may be pardoned for saying that, considering how important such work is likely to be in war, our camps of instruction should have the means for giving that training.

It is most important that every man should know his own position and duties in the fight, and, however hurried the preparations may be, this part of them should never be omitted. We must try to get out of our heads the notion that the soldier is a mere machine only to be worked by a perpetual series of impulses given by his commanders. If he is so it is our fault for not teaching him better. Surely you all find in your spring training here that the British soldier is anything but a fool, and that he responds to all attempts to give him a more intelligent sense of his duties and responsibilities.

Continuing for a while to regard the fight from the defensive point of view, we must suppose the attack to have made good its footing at two or three points on the outer edge of our village, as for shortness we will henceforth call it. The first point of importance is to prevent the attackers from following closely up the troops retreating from the combat outside, and this should be provided against, not only by the action of the inner reserve fighting at barricades and by the defenders of the houses, but also by the threatening advance of the outer reserve, which will do well to make a counter-attack at this moment when the enemy is confused by the fighting and broken up by the difficulties of the obstacles which he has surmounted. At this stage the defense should be better in hand than the attack, as the defenders of prepared houses will have been kept out of reach of the artillery bombardment, which must now cease, since the attacking guns cannot fire on that part of the village which their own troops have carried. All hands should have been made to understand that a first success of the attack is far from being an end of the affair. The internal defense may last for hours or even days in spite of the enemy's numerical superiority. The first advance will be attempted by the streets and met by fire from the barricades and houses lining the streets. If, as is probable, a rush is made along the streets from the point first carried, the inner reserve should meet it by a counter-attack. We will suppose that the enemy is checked in his first attempt to rush the place. The defenders should then try to push him out again before he has time to settle down in the captured houses. If this effort fails, there will probably be a lull while the attack is securing the advantages gained and fresh troops are coming up for the street fighting. Perhaps this will be the last chance for the commander to communicate with his various sections, and he should use it by giving all possible information as to the condition of affairs to his subordinate leaders. Henceforth the best thing he can do will be to attend to the outer reserve and prepare for a series of vigorous counter-attacks.

Now comes the bitter struggle in the streets and houses, and there is no

stronger test than this of the courage, tenacity, and training of the individual soldier. In the first village fight of 1866, that of Podol, a mass of Austrians were at one time so jammed together in a side street that they could not load their rifles, which were, of course, muzzle-loaders; and numerous cases might be cited in which the heroic defense of a single house has checked a triumphant enemy for a long time. I shall presently mention an example or two, but for the moment it must suffice to say that the defenders ought to make it impossible for the attack to advance up a street beyond the point where they have carried the houses on both sides, especially the right side, as will be presently explained. And we have to remember that the groups of houses are in themselves obstacles till they are carried. Your friends may be in a side street only fifty yards away, they are of no use to you unless they or you have possession of the intervening houses. It is this fact which makes the capture of a village such a long business when well defended. If, driven from house to house and room to room, the defenders are gradually forced back along the streets, there will still remain the main keep to be defended, and this may occupy a considerable time and even be successful if the outer reserve makes a thoroughly vigorous counter-attack. In the fight for Bazeilles the Bavarians were at one time driven clean out of the village streets and back to the river by such a counter-attack, though they still retained a footing in some of the houses. And this suggests one great point in the instructions that should be given to all subordinates. The village should never be regarded as captured so long as even one house holds out. It is always a point of vantage upon which a counter-attack may rely. One of the most powerful agents on both sides is the use of fire, which may be used by one side or the other according to circumstances, direction of the wind, and so on. It is most important that each house and section should have its own means of extinguishing conflagrations, though the defenders may sometimes find it advantageous to kindle them.

We have then, from the point of view of the defense, an obstinate holding on to every point of vantage, and a series of counter-attacks to recover lost ground, the whole scheme worked by a proper chain of responsibility, sections under their own commanders, an interior reserve under separate command, and the outer reserve held in the hand of the commander of the whole: a tenacious defense culminating in that of the main keep, but not even ceasing if it is captured: plenty of counter-attacks, and, finally, a clinging to the very last house in hopes of success after all. But perhaps the best mental picture will be formed if we now take the side of the attack.

Interior Attack.—Supposing that an entrance has been effected, and some houses seized, the further advance should be as rapid as possible, and an attempt must be made to press on along the main streets. But one precaution should never be omitted, namely, to prepare against the defenders the houses which are first occupied. It is of the utmost importance that no time should be lost. The infantry should rush into the houses, if possible, before the defenders evacuate them, and search at once for any commencement of conflagration or preparations for explosion. The most command-

ing and strongest houses should then be prepared for defense against attacks from the defenders of the village, and every endeavor be made to sweep the streets. For this purpose the barricades relinquished by the defenders may often be used against them. It is evident that the troops used for making good what has been captured must be quite distinct from those who are to push on to further conquests. These latter we will call "columns of attack."

Columns of Attack.—These columns will have two difficulties to encounter:

1st. The defense from the front and sides of the street itself.

2d. The flanking fire of posts especially prepared for that purpose.

Even for advancing up a street there is a right and a wrong way. The worst way is to move solidly and stolidly up the middle of the street, for, if you do, the barricade defenders will have their best opportunity for fire, and the average difficulty of shooting from the windows of the houses will be at a minimum. Now imagine yourselves looking out of a window down a street to your right, you will find that, whether the enemy advance down the centre or at either side, the defenders cannot take aim and fire at the column without exposing a great part of their bodies. Now imagine the enemy to be advancing from your left, you will find that defenders from that position can see down the street for a considerable distance without any exposure worth mentioning, but must lean outwards a little to fire down your own side of the street. Apply this to the benefit of the attack, and it will be evident that the advance should be made either on both sides of the street or, if on one side only, then by the right side from the point of view of the attack.

Organized Advance.—Supposing the defense to be weak, the attackers should advance rapidly by all the streets leading from the base seized on entering the village. As far as possible the columns should work together, communicating by side streets and helping each other to turn barricades. But if the defense be strong and well conducted and the defenders have so occupied the houses on both sides of the streets as to fire on the rear of the attacking columns, it will be necessary to secure the ground step by step, breaking into the houses either by axes and musket butts, or even by charges of gun-cotton, which should be carried for the purpose by special parties—of engineers, if possible, though all soldiers should be taught the use of gun-cotton for such purposes.

Flanking Fire of Defenders.—A well considered defense will have established special posts for flanking fire. These may be either in the street itself or in side streets, or in the combination of the two formed by corner houses where streets cross. In the first two cases they must be carried either by a rush or by turning them first and carrying them afterwards. In the last case, and generally on arriving at important cross streets, the attack should occupy and organize the corner houses before pushing on, unless the enemy is making such a weak defense that you can press him steadily back without delay.

Defense Not Always Complete.—Here we may pause for a moment to remark that all street fighting is not necessarily the attack and defense of a

fortified village. It may be that an enemy retiring before you leaves a portion of his rear guard in a village to delay the advance of artillery, etc., along a main road. In such a case the defense may make a great show of fire from the outskirts, and you might suffer considerable loss and delay in making a front attack. Your tactical knowledge must enable you to judge the situation, and your skill will be shown in sending part of the cavalry and infantry round by the flanks while the artillery opens on the front of the village. In most cases the enemy will evacuate it, when your main body, which will be that of your advanced-guard, can push through at an increased pace. But in no case send your artillery through a village which has been occupied by the enemy without the company of other troops. A very few men remaining there might cripple your batteries for a long time by shooting the horses. In no position is artillery so helpless.

Military Notes.

CAVALRY CHARGES.

IT may be well to bring before our readers the origin and nature of the evidence on which the "cavalry cannot charge unshaken infantry" dogma is founded. It is necessary to do so, as this is essentially a question which has been prejudged, and to the detriment of what we hold actually is and should be the finest branch of our Service. The idea in England was originally started, and has since been principally maintained, exclusively by infantry and artillery officers. As regards French Revolutionary cavalry charging squares of British Peninsular infantry, no deduction could be fairer or better based. But it was and still is a mistake to jump to the conclusion that this evidence established the case universally as between the two arms; for where the rôle was reversed, and British cavalry charged French infantry, even where the latter were war-seasoned veterans, the result was, in seven instances out of eight that occurred during that war, precisely the opposite. The British cavalry (or King's German legion, as the case might be) rode over and exterminated their enemies, even though the latter are certified on all sides to have stood up to the attack in perfect order, and to have delivered their fire with coolness and *sangfroid*. What the result might have been as between British cavalry and British infantry is and always will remain an open question, for it is impossible to conceive such an occasion arising, though British infantry officers almost invariably assume it whenever they take part in discussions on the subject. Up to the end of the Seven Years' War—and, indeed, till well on into the tenth decade of the last century—cavalry had been the undisputed arbiters of the battle-field. Not only the Prussians under Seidlitz and Ziethen, but British and Austrian squadrons had again and again swept ten times their number of infantry away before them. The deeds of the Baireuth Dragoons at Hohenfriedberg, of Seidlitz' Horse at Zorndorf and at Rosbach, are too well known to need recapitulation; but the glorious part played by the 15th Hussars, in conjunction with some Austrian squadrons at Villiers-en-Couche, on April 24, 1793, and Chateau Cambresis two days later, seem to be in danger of fading out of recollection altogether. Twenty years after it had become a fundamental axiom of tactics in Continental nations, from whom we have borrowed it, that horses cannot be got to face the bayonets of a square, let alone its fire. The 15th—probably because the examination for promotion was not an established fact in those days—seemed to have found no difficulty in getting their horses to accomplish the "impossible." But, in the meanwhile, what had occurred to make the difference? The equipment and armament of infantry had re-

mained "stationary," and it cannot be maintained that the men had improved in any way; for it is historically notorious that the reverse was the case, all Europe having been drained of fighting men, and the incessant sequence of wars having allowed no time to train and discipline them up to the standard formerly exacted. The explanation is that all over Europe—except in England—the cavalry had deteriorated even more rapidly than the infantry. The Prussian cavalry had been destroyed at Jena, thanks to its piecemeal employment with the infantry divisions; Ulm, Austerlitz, Regensbourg, and Eckmühl had accounted for the Austrians; the Russians never had any Regular cavalry worth speaking of; and the number of mounted men supported by the French was altogether below the proper proportion of artillery and infantry. Relatively to one another, they still maintained the positions or reputations already acquired during the course of the struggle. It is not much to be wondered at, therefore, that Continental nations were prepared to accept the dictum of French writers without much questioning. But that we should have accepted it as applicable to our own cavalry is most unaccountable. Nevertheless, thanks to the habit we have of never thinking for ourselves in these matters, we did so, in spite of the really glorious record our cavalry earned for itself during the war. The dogma that "cavalry cannot charge unshaken infantry" was firmly rooted in our military profession of faith even before the breech-loader appeared on the scene. What wonder, then, if our cavalry bowed their heads to the inevitable when this new implement of destruction, capable of being fired six times more rapidly, and shooting four times as far, and with considerably greater accuracy than the old Enfield, was brought into practical application? The conclusion was by no means inevitable, for the new weapon not only entailed considerable alterations in the nature of the fight itself, but it was contemporaneous with another and far more wide-sweeping change in the nature of armies altogether—viz.: the universal adoption of "short service." The increased mental strain induced by the noise of breech-loading firing, the greater number of bullets to be encountered in a given space of time, and the tenfold greater depth of ground swept by fire, have not only abolished the old close-order, shoulder-to-shoulder fighting, but have rendered the attainment of the old close-order standard of discipline absolutely unattainable in the time available. The Prussians and Germans have all along striven hardest to hold on to it. Have they succeeded? The ravine of the Maine below Gravelotte, the underwood in the Bois des Ognons, and a score of other places, could tell some tales. That French cavalry failed to make a serious impression on infantry on some occasions in 1870-71 proves nothing, for the cavalry frequently attacked under such disadvantageous conditions of ground and leading that no decisive result could have been anticipated. Yet, except at Mars-la-Tour, Vionville, and Beaumont, it must be admitted they amply gained their immediate object,—viz., time—and if it were possible to balance out exactly the amount of loss relatively saved or inflicted in the time thus gained, we fancy it would be found that each cuirassier or chasseur who fell at Woerth or Sedan paid for himself two, even three times over; and absolute loss in killed and wounded still counts for a good

deal, *pace* the "bloodless strategists." On the other hand, the Prussian cavalry charges against the long-service soldiers of the Empire, who, in point of war-seasoning and steadiness under fire, were certainly superior to anything the Germans or ourselves are likely to confront again, were uniformly successful beyond even the expectations of the leaders who authorized them. Exact statistics show that they were not paid for at a disproportionate price. How many Brandenburger infantry soldiers would it have cost to stop the advance of Canrobert's corps at Vionville, a duty carried out by Bredow's 800 horsemen with a loss of 50 per cent.? The blood-stained slopes of St. Privat may answer that question. Von Wedell's infantry brigade, some 6000 strong, lost 57 per cent. in its attempt to force back Grenier's infantry division of the 4th Corps. Yet the same division, when advancing flushed with its comparatively easy victory some few minutes after, was compelled to retire in confusion by the charge of the 1st (Queen of England's) Dragoons of the Guard, who lost some 30 per cent. only of their men. The same division proved what fighting stuff it was made of two days later at Amanvilliers. Both these results were obtained by cavalry which, from the leader downwards, thought themselves "elected" before they even moved off, and in neither case were the numbers employed at all commensurate with the object to be attained. It may be argued that all this is as prehistoric as the old smooth-bore experiences; for nowadays we have repeaters, small-bore rifles, and smokeless powder. We submit, however, that in the same time not only has the power of artillery to prepare the way increased in a far higher ratio, and the facility and intelligence requisite for the employment of cavalry in masses likewise, but also that the strain of the fight itself on the infantry—in particular the time that with long-ranging weapons they must be under fire—has rendered the latter less capable of opposing a steady front to the cavalry, always assuming that the latter are not prematurely thrown away, but are sent into the fight at a moment when the mental strength of the opposing infantry has had time to wear itself out. When that moment comes, cavalry trained to charge *en masse*, as all Continental cavalries now are, and as our own in India is rapidly being taught to do, will find the infantry as easy a prey as ever Napoleon's men on horses, employed at the same period of the action, found the Continental infantries eighty years ago.—*Army and Navy Gazette*.

THE REORGANIZATION OF THE GERMAN ARMY.

On April 1st, a change was effected in the organization and distribution of the German Army, which shows that the military authorities at Berlin are fully alive to the necessities of the times, and that they considered the military forces of Germany were in need of further strengthening. Although the changes made are described as a reorganization, they in reality represent an increase. By the Imperial orders recently issued, the number of German Army Corps has been augmented by three, the three new corps being located in Elsaß, Lothringen, and West Prussia respectively. Hitherto the German Army comprised the corps of the Guards (garrisoned chiefly in Berlin and Potsdam, and recruited from all parts of the empire), fourteen army corps (located and recruited respectively in East Prussia,

Pomerania, Brandenburg, Province of Saxony, Posen, Silesia, Westphalia, the Rhine Province, Schleswig-Holstein, Hanover, Hessen-Nassau, Kingdom of Saxony, Württemberg, and Baden, and numbered from one to fourteen in the order in which they are named), and the 1st and 2d Bavarian Army Corps. The three new corps (the 15th, 16th and 17th) bring up the total number of German Army Corps to twenty. The several army corps vary considerably in composition and strength—from 21 to 36 battalions of infantry, 20 to 40 squadrons of cavalry, 12 to 25 batteries of artillery, 2 to 5 companies of engineers, and 1 to 4 companies of train or transport troops. The total effective of the twenty army corps is now 534 battalions, 465 squadrons, 364 batteries, 79 companies of engineers, and 55 companies of train. These changes of organization are intended to increase the readiness for war of the German Army, while they conform to the provisions of the so-called Septennate Law of March, 1887. Each army corps (with the exception of the 11th and 12 army corps) consists of two divisions of infantry, one brigade of field artillery, one battalion of engineers, and one battalion of train; the 11th and 12th army corps having respectively three divisions of infantry, a battalion and a half of engineers, and a battalion of independent companies of train.

The annexed table shows the present composition of the German Army:

| Army Corps. | Battalions. | Squadrons. | Batteries. | Companies of Engineers. | Companies of Train. |
|---|-------------|------------|------------|-------------------------|---------------------|
| Corps of the Guards | 29 | 40 | 20 | 5 | 3 |
| 1st Army Corps (East Prussia) | 25 | 30 | 20 | 4 | 2 |
| 2d " (Pomerania) | 24 | 20 | 14 | 2 | 2 |
| 3d " (Brandenburg) | 25 | 20 | 18 | 2 | 3 |
| 4th " (Province of Saxony) | 24 | 20 | 18 | 4 | 2 |
| 5th " (Posen) | 25 | 20 | 17 | 4 | 3 |
| 6th " (Silesia) | 25 | 25 | 20 | 4 | 3 |
| 7th " (Westphalia) | 25 | 20 | 18 | 4 | 3 |
| 8th " (Rhine Province) | 24 | 20 | 15 | 4 | 3 |
| 9th " (Schleswig-Holstein) | 25 | 20 | 18 | 4 | 3 |
| 10th " (Hanover) | 24 | 20 | 18 | 4 | 3 |
| 11th " (Hessen-Nassau) | 37 | 30 | 25 | 4 | 4 |
| 12th " (Kingdom of Saxony) | 36 | 30 | 23 | 4 | 3 |
| 13th " (Württemberg) | 21 | 20 | 18 | 4 | 3 |
| 14th " (Baden) | 28 | 20 | 18 | 4 | 3 |
| 15th " (Elsass) | 30 | 20 | 17 | 4 | 3 |
| 16th " (Lothringen) | 27 | 20 | 12 | 4 | 1 |
| 17th " (West Prussia) | 25 | 20 | 15 | 4 | 2 |
| 1st Bavarian Army Corps | 29 | 20 | 20 | 5 | 3 |
| 2d " " | 26 | 30 | 20 | 5 | 3 |
| Totals | 534 | 465 | 364 | 79 | 55. |

The lowest number of batteries required by an army corps on a war footing has been generally fixed at twenty batteries; but in Germany this number is only reached by five corps—namely, the corps of the Guards, 1st (East

Prussia) and 6th (Silesia) army corps, and the two Bavarian Army Corps. It will therefore cause no surprise that, independently of the numerical superiority of the French artillery with 480 batteries (24 batteries of six-horsed guns each for each army corps), and that of the Russian artillery, which, after its reorganization, will number 490 batteries (16 batteries of eight guns each for each army corps), the question of increasing and reorganizing the German field artillery (at present comprising 364 batteries of six only partially horsed guns each) has become a most important one, and is to engage the early attention of the new German Reichstag, which met this week.—*United Service Gazette.*

HIGH EXPLOSIVES AGAINST EARTHWORKS.*

To the Editor :

SIR:—In matters of this kind empirical results are of the first importance, and the Lydd Experiments, 1888, are therefore, useful, not only in their practical bearing on earthworks and field fortifications generally, but in dispelling the erroneous and exaggerated ideas that appear to accompany every novel invention.

Many, many years ago—when some of the old fortifications were being cleared away at Chatham—gun-cotton and gunpowder charges were pitted against each other, and the results (not by any means anticipated) were slightly in favor of the old explosive. Major Clarke was probably thinking of these or some other and similar results, when he wrote the sentence quoted by Captain A. E. Haynes in the *R. E. Journal* for this month.

Theoretically, there does, I think, appear to be some "reason to expect greater effects against earth parapets from the use of high explosives" in shells as compared with gunpowder charges, but certainly not to the extent implied by the sentence quoted from General Brackenbury's book on "Field Works."

One litre of nitro-glycerine produces 1298 litres of gases at a temperature which tends to expand them to 10,400 litres (Nobel), and the rending force of blasting oil is to that of gunpowder, according to volume, as 13 to 1 (Eissler).

This rending force or "pressure is the factor which produces rupture of the envelope, but does not necessarily produce any extended mechanical effect. * * * This last represents the work equivalent" (Hake). In other words high explosives are superior as rending agents, but not necessarily superior as moving agents.

In this latter application the relative mechanical equivalent of explosives may usefully be borne in mind :

| | Work. | Relative Value. |
|---|---------|-----------------|
| Blasting powder (62 per cent. KNO ₃)..... | 242,335 | 100 |
| Dynamite (75 per cent. NG)..... | 548,250 | 226 |
| Blasting gelatine (92 per cent. NG)..... | 766,813 | 316 |
| Nitro-Glycerine | 794,563 | 328 |

Assuming that the high velocity shells employed in field artillery can be

* *Royal Engineers' Journal*, May 1, 1890.

charged with blasting gelatine—a rather large assumption—it would appear that theoretically they would be more efficient for levelling earthworks than gunpowder charged shells, but the question of time, so important in everything connected with explosives, probably reduces the mechanical effect of earth removal by the higher explosives, because much of their work equivalent must be absorbed by the pulverizing of material immediately surrounding the charge, such loss being almost absent in the case of gunpowder and other low grade explosives.

I am, Sir,

Your obedient servant,

April 12, 1890.

J. T. BUCKNILL.

HIGH EXPLOSIVES IN SHELLS.*

To the Editor:

SIR:—I regret to find myself—as Capt. A. E. Haynes points out—in a position of antagonism to the views of so distinguished a writer as Major-General Brackenbury; but, in presence of inexorable facts, I am unable to withdraw a single word of the paper quoted. From the first I have carefully followed our experiments with high explosives, and there is but one conclusion to be drawn from them.

In 1885, comparative experiments were carried out with gun-cotton, meta-dinitro-benzol, and blasting gelatine, the latter being one of the most powerful explosives known. The benzol shell were those of the Gruson firm, whose representative prepared them for use. The crater results in an earth parapet convinced the ordnance committee that "little or no increase of work seems to be gained by the use of a high explosive under these conditions;" and that such explosive is "too quick in its action for use in earthworks, but would seem to be adapted for use when a sudden and local effort was required."

In 1887, a number of gun-cotton shells were buried in shingle and fired electrically. The craters afforded comparisons with those due to powder shells, and fully bore out the above conclusion. In 1888, Lyddite shells were tried, and the results entirely justified the opinion I have stated, which was also that arrived at by the ordnance committee. There have been other experiments at different times, affording further confirmation of this opinion. Experiments with field shells have been very recently carried out which do not point to any advantage from the use of high explosives, although Sir C. Dilke appears to think that the defenses of Quetta can thus be easily destroyed.

Against masonry, high explosive shells, provided that they can be planted in the right spot and properly detonated, will naturally be effective. Used without fuses in armor piercing shells, they may have advantages, although the fact is not as yet established. In common shell employed against ships, they have both advantages and disadvantages. In one sense their effect is greater than that of powder by reason of shock and the quantity of small splinters thrown off; in another sense, it is less from the diminution of

* From the *Royal Engineers Journal*, May 1, 1890.

smoke and flame, and the absence of large fragments capable of causing serious structural damage, against which it is difficult to provide protection. No great preponderance of advantage has been made out, and there is nothing in melinite thus used to create a naval scare. Against earthworks, as I have stated, it may be taken as established that no advantage whatever is likely to be obtained by high explosives. In all cases except possibly when gun-cotton is employed, there appears to be a certain measure of risk, arising less from the explosive itself than from the powerful detonators required, and necessarily, especially serious on board ship.

The precise state of the melinite question in France cannot be stated. The French have adopted this explosive to a large extent; but it is certain that they have met with considerable difficulties not yet wholly removed.

Meanwhile it is not unnatural that the Press should have indiscriminately lauded the explosive on which so much money has been spent, and mere newspaper reports are responsible for the exaggerated statements that have found their way into too many books and papers.

I consider that we have never yet obtained the best possible results with powder bursters, and that in place of the long, expensive, and somewhat desultory experiments with high explosives, the development of powder-charged shells would have been wiser. This, however, is merely an individual opinion.

The question of long shells is of another kind, and in these projectiles some of the European Powers are far ahead of us. In the Paris Exhibition large numbers of $4\frac{1}{2}$ and 5 calibre shells of excellent manufacture were exhibited, and ten firms are now able to supply them.

"The future of field artillery" does not lie in the direction of high explosives, but in the development of shrapnel fire. In the latest pattern of shrapnel the French have also gone beyond us.

I am, sir,

Yours, etc.,

LONDON, April 17, 1890.

G. S. CLARKE.

SOUND VELOCITY APPLIED TO RANGE-FINDING.*

Captain G. G. Aston, R.M.A., has lately communicated a paper to the Royal Artillery Institution (*Proceedings R. A. Institution, Vol. XVII., No. 10*), giving the results of recent experiments undertaken in France and Germany to ascertain whether a sufficiently accurate approximation to the range for practical purposes can be obtained by noting the time that elapses between the flash and the report of the gun. Consequent on the statement in the official *Text-book of Gunnery* (1887), that this means of range-finding gives a good approximation, several stop-watches and sound telemeters have been invented on this principle, one of which was used with some Egyptian ordnance in the Soudan.

In the French experiments sound-velocities as high as 1,969 f. s. were registered, and in Germany 2,034 f. s., and it follows that an error of about

*From the *Royal Engineers' Journal*, June 2, 1890.

80 per cent. might be made in judging a range by this method if the sound velocity, 1,130 f. s., given in the text-book, be used.

The experiments tend to show that :

1. Sound-velocity in the direction of the path of a projectile increases with the initial velocity of the projectile.

2. The average sound-velocity diminishes with the distance of the observer, the other factors remaining the same.

Some of the results, however, obtained with the 5.9-inch howitzer do not bear out this second rule, and the apparent anomaly is explained by a writer in the *Deutsche Heeres-Zeitung* by the theory that the sound wave forms a cone with a curved axis similar to that formed by shrapnel and case shot, of which the portions near the surface of the cone move with less velocity than those near the axis. This theory is not, however, fully borne out by the trials with the 8.3in. howitzer.

In the face of these discrepancies the only certain conclusions to be drawn from the experiments hitherto made are that the muzzle velocity and the distance of the observer have great influence on the sound-velocity. The effect of wind is not ascertainable from them ; this, and the effect of different calibres and kinds of powder, of the elevation of the gun and the relative height of the observer, would be interesting points to study in any future experiments.

THE RIFLE OF '88.

Translated from N. Y. *Staats Zeitung* by Lieut. Carl Reichman, 24th Infantry.

The veil of secrecy surrounding the new rifle of the German infantry has finally been lifted by the publication of the new musketry and drill regulations. As the former contains the first reliable data of the power of the new weapon, it will, of course, excite a good deal of interest. It is to be remarked, however, that the principles of the old musketry regulations, based as they are on years of experience (it is the fourth set of musketry regulations since 1871), have suffered no alteration whatever. More stress is laid on increased instruction in musketry to correspond with the increased efficiency of the new weapon. Technically noticeable is a small change in the off-hand aiming, as to the advisability of which the opinions are probably divided, and the substitution for the present targets of one general target with rings. The regulations contain sketches of the same, also several tables in connection with the text.

This "ring target" is the logical consequence of the greater grazed zone as given by the new rifle. It does not matter whether the enemy is hit in the chest or legs so long as he is put *hors de combat*. The tendency is, therefore, to bring the bullet within the height of a man. According to the general order of November 21, 1882, preceding the text, the regulations are to apply also to the Rifles, Pioneers and Railway troops.

The initial velocity of the projectile 25 metres (metre = 39.37 inch) from the muzzle averages 620 metres = 2033 feet ; the extreme range with an angle of elevation of 32 degrees is 3800 metres = 4122 yards. The projectile has the following penetration :

| | | |
|---------------|--|--------------------------|
| At 100 metres | 31 $\frac{1}{2}$ in. | of dry pine, solid, |
| " 400 " | 17 $\frac{1}{2}$ " | " " |
| " 800 " | 9 $\frac{1}{2}$ " | " " |
| " 300 " | a little over $\frac{1}{2}$ in. of plate iron, | |
| " 100 " | 35 $\frac{1}{2}$ in. | in newly thrown up sand, |
| " 400 " | 19 $\frac{1}{2}$ " | " " |
| " 800 " | 13 $\frac{1}{2}$ " | " " |
| " 1800 " | 3 $\frac{1}{2}$ " | " " |

To protect against infantry fire a breast-work of earth must be at least 29 $\frac{1}{2}$ inches thick.

The musketry regulations contain sketches of such hasty intrenchments as can be made with the spade, the dimensions given being the smallest consistent with safety, in order that they may always be observed as the prescribed normals. Thin brick walls give but incomplete protection, as they are penetrated if struck in the same place by several bullets. It might have been added what dimension is meant under "thin."

The fixed sight is for ranges up to 300 metres, the flap sight to 400 metres. At a range of 600 metres the dangerous space for a target 47 inches high is 79 yards, for one 5 feet 7 inches high 122 yards, and for one 6 feet 6 inches high 157 yards. Using the fixed sight, all targets up to 6 feet 6 inches high are entirely within the grazed zone up to 300 metres, using the flap sight all targets from 33 $\frac{1}{2}$ inches to 6 feet 6 inches high. Hence the extraordinary power of the rifle of 88.

The regulations of 1888 for the infantry have "as reprint of 1889" again been published as supplement to the musketry regulations. Changes occur only in those parts relating to the construction of the new rifle and to the new powder. They occur, therefore, almost exclusively, in the first part treating "of the school"; the second part, treating of "battle," is only so far touched upon as to eliminate all considerations for the smoke, which, so far, played an important part in the "direction of fire." The distances for all objects have in accordance with the superior grazing power and range of the new rifle, been considerably increased; the third part, treating of "parade," has not been changed.

The regulations show that there are many new terms for the parts of the rifle of 88, which must be mentioned during instruction. We mention: "the barrel cover" (the rifle is provided with a cover for the barrel as protection against its heat), "cartridge frame," holding four cartridges, an improvement on the old magazine. As for the rest, the rifle of 88 is a "multiloader" proper, while the one of 84 was a single loader, with a magazine for special purposes. As the magazine exists no longer, the instructions for loading and the kind of fire to be used had to be changed and, partly, very much simplified. For instance, the emptying of the magazine formerly prescribed has disappeared, and so has the name "magazine." Five paragraphs of the first part could thus be struck out; it now contains 224 paragraphs against the former 229. The kinds of fire are: volley and individual fire; the latter as to its rapidity is divided into slow, quick and rapid fire. This old trefoil, changed for a short time by the magazine fire,

has therefore been reinstated, and magazine fire been replaced by rapid fire.

(*Translation.*)

DAS INFANERIE GEWEHR '88. BERLIN, 1890.

The Ammunition.

The ball cartridge consists of the cartridge case, the priming cap, the powder charge, the cardboard wad and the projectile.

The cartridge case is of brass and bottle-shaped, and provided at its rear end with a groove for the ejector. At the middle of its base is the priming chamber with two fire openings and the anvil for the priming cap.

The priming cap is of brass and contains the priming composition, which is covered with tin foil.

The powder charge consists of 2.5 grammes (—38.6 grains) of a brownish small-leaf powder, which occasions much less smoke and noise than the ordinary black powder.

The cardboard wad separates the powder charge from the projectile.

The projectile weighs 14.5 grammes (—223.76 grains). It consists of a hard lead core pressed into a cover of steel plate covered with copper-nickel or nickel-copper plate. It is cylindrical with a blunt head. If it were not for this cover, the long lead projectile could not follow the rapid twist of the groove; and then, on account of its very high velocity (620 metres.—2033 feet in the first second), its form would be changed and its penetration reduced.

Ratio of weight of powder to that of projectile = 1 to 5.8.

The blank cartridge consists of the cartridge case, priming cap, powder charge, wad, and the hollow wooden projectile.

The drill cartridge consists of the cartridge case and the brass head, which takes the place of the projectile.

The ball cartridges are packed five in a case, three cases to a box. The man carries two boxes in each of his front cartridge pouches and six in his rear one—in all 150 cartridges. These weigh, all told, about 5 kg. (—11 pounds). Hence the musket is very light, weighing only 3.8 kg. (—8.5 pounds).

UNVEILING THE ROYAL ENGINEERS' GORDON STATUE.*

The statue, as most of our readers are aware, is of bronze, by Mr. Onslow Ford, A. R. A., and represents General Gordon seated on a camel. He is dressed in his uniform as Governor General of the Soudan, and wears his orders and medals.

He carries the historical rattan in his right hand, and with his left he is reining up the camel, which throws the animal's head back and gives him a fine pose. The statue is 12 ft. 6 in. high, and the pedestal, which is of Portland stone, is 5 ft. in height; there is an outside curb of Portland stone; the space between this and the pedestal is planted with forget-me-nots, with groups of arum lilies at each corner; this little garden forms part of the

* From the *Royal Engineers' Journal*, June 2, 1890.

design of the pedestal. Around three sides of the base of the bronze is introduced the names and places with which Gordon was identified, and in the front the one word "Gordon."

The inscription on the pedestal reads as follows:

CHARLES GEORGE GORDON,
Royal Engineers,
Companion of the Bath,
Major General of the British Army,
Mandarin of China,
Pasha of Turkey,
Governor-General of the Soudan,
Born at Woolwich, 28th January, 1833,
Killed at Khartoum, 26th January, 1885,
Erected by the Corps of Royal Engineers, 1890.

Comment and Criticism.

(The remarks under this head have, generally, been invited by the Publication Committee, which desires that as far as practicable these "Comments" should appear over authors' names.)

I.

"Historical Sketches of the Army."

Captain J. P. Schindel, 6th Infantry.

AS Colonel Anderson, in his historical sketch of the 14th Infantry, does not advert to the combat which took place at the Peach Orchard, Gettysburg, July 4th, and in which his regiment took part—a combat that was continued, later, as "picket-firing"—a few pertinent facts may not come amiss.

Pretty early in the forenoon of July 4th, the First Regular Brigade, under Gen. H. Day, was ordered to the front, to "feel" the enemy : leaving the position occupied during the 3d, in rear of the Little Round Top, by the road leading to the Orchard, the column, just before reaching the Wheat Field, was deflected to the right to secure the shelter of the woods ; reaching the outer end of the woods the brigade was formed in two lines—the first, composed of the 3d, 4th and 6th Infantry, commanded by Captain (now colonel) Boote, and the second, composed of the 12th and 14th Infantry, *I think*, by Major Giddings, and, covered by Captain Thatcher's Co. of the 14th, advanced in this order toward the Emmitsburg Turnpike—the skirmishers penetrating the Peach Orchard, the first line halting at its edge, and the second, in the open space intervening.

Stray bullets had been falling amongst the troops before leaving the woods—one wounding Lieutenant Crowley, 4th Infantry—and as soon as the skirmishers emerged from its shelter, a brisk exchange of fire began, which was kept up for about an hour, after halting, men detached from the flank companies of the 6th and 14th, meanwhile replying to the fire from the left, opened by covering parties of the enemy, ensconced behind stone walls and small redan shaped shelters made of stones and fence rails.

About 11 o'clock, finding the lines exposed to enfilading artillery, the brigade was ordered to retire, which it did under fire from a rebel battery posted near the Fairfield road, and which was answered by the Federal battery on Little Round Top—this being the last artillery firing at Gettysburg. Almost reaching its original position, the column faced about and proceeded to establish a "picket line"—really a line of skirmishers in groups—along the edge of the woods to the left of the Wheat Field, through the "Devil's Den," and along the open crest of Plum Creek, between the two Round Tops. As soon as the rain, which had been falling in torrents, ceased, picket firing began, which lasted till after dark, the 14th Infantry, if not the last, certainly among the last, who fired upon the enemy at Gettysburg.

During the night of the 4th the last Confederates left, and early on the morning of the 5th a skirmish line was advanced—Benedict's Company of the 4th, and Company "I," 6th Infantry, being part of the force from the "Devil's Den" to a point beyond

the Emmitsburg Turnpike, and near the Fairfield road, a force of Confederate cavalry and artillery being *reported* in sight on the latter road.

FT. GIBSON, I. T., July 28, 1890.

II.

"A Regimental Court of Honor."

Captain J. G. D. Knight, Corps of Engineers.

IN the May number of the JOURNAL, the need of "something of the kind" was taken for granted.

What is to be corrected by such a court? In general terms it was stated that the honor of the brotherhood of officers is being allowed to suffer from neglect, to go by default. The particulars given were:

1. That the reviewing authority has often reversed or mitigated a sentence of dismissal for conduct unbecoming an officer and a gentleman.
2. That sentences of dismissal of cadets for lying have been set aside.
3. That Congress has restored to their grade and rank culprits who have been cashiered.
4. That members of courts-martial have recommended to clemency, those whom they had sentenced to be cashiered.
5. That there is too little observance of the rules of courtesy and official etiquette and too much disposition to find fault, to grumble and to give utterance to our thoughts of our superiors in rank, our commanding officers, our comrades.

Did it occur to the author that drawing up details 1 to 4 inclusive may be considered as verifying the fifth particular?

What is the remedy proposed? A Regimental Court of Honor. Right here let protest be made against the regimental feature. What we should have at heart is not the honor of any particular regiment, but that of the entire army. Moreover customs of service may creep in and be considered honorable here and dishonorable there. Better then for both reasons, that courts be not regimental.

It is unnecessary to consider more than one feature of the proposed courts. Are their proceedings to be subject to review? It is stated that in the German service, the Emperor is the reviewing authority; and in the Austrian, for the courts considered, the commanding general of the division. Evidently reviewing authorities are contemplated; hence courts of honor will not end details 1 and 2.

Members of a Court of Honor may recommend to clemency as well as those of a court-martial. So far as the fourth detail is concerned, Congress would be no more influenced by the one court, than by the other. What remains then to be remedied by the Court of Honor? That embraced in the fifth detail. When the matter there mentioned is thought worthy of notice, some officer must initiate proceedings by a so-called Council of Honor. This council resembles our Court of Inquiry, and what says the 115th Article of War of the objections to such courts? That they "may be perverted to dishonorable purposes," that they may be employed "as engines for the destruction of military merit." These being their dangers, what follows? "They shall never be ordered by any commanding officer, except upon a demand by the officer or soldier whose conduct is to be inquired into."

There is no place in our Service for the Council of Honor. The Court of Honor is no more nor less than a disguised court-martial; and courts-martial are sufficient for all ends to be obtained by Courts of Honor. They will be found so, just so soon

as officers generally will prefer charges against those whom they know to be guilty of conduct unbecoming an officer and a gentleman.

WASHINGTON, D. C., June 21, 1890.

Colonel John Hamilton, U. S. Army.

The Council of Honor (*Ehrenrath*) of the German army is a most excellently suited institution to that people. Probably in the army of no other nation is the idea of the soldier's descent from the chivalry of the middle ages so well preserved or cultivated. In no period of Germany's latter history has the idea of the soldier being the servant of the people had any acceptance in the public mind. The army is nurtured as the right hand of imperial authority first, and next, as the aggressive force of the nation. Although the commoner regards it with pride—its successes are his—yet it is useless to deny that he looks with jealousy upon its social and legal immunities. If, as in our country, its organization sprang from the people, it is not doubtful that its peculiarities would be materially affected.

With other matters (which follow) this *Ehrenrath* came over from knighthood as a thing to be carefully preserved to the *militaire* as an honorable distinctive appanage, not admitted to the commoner.

Another, like inheritance, it is believed few of us would not accept, namely: That every officer before being gazetted to a regiment, must be accepted by the officers thereof. What a heresy this would be to our political appointing powers! The German army can protect the purity of its *cadre* against the imperial will, while our Army can be debased by the place-demanding of the lowest *heeler*s.

Again, if in our Army some like checks (not financial but character checks) were placed upon marriage, as are inherited in the German army, the number of scandals and heart-burnings might be reduced in the Service. However it may be with a man in the outer world of civil life, no officer has a right to bring into the "brotherhood of officers," into the close circle of army life, where there is so much domestic interdependence, a wife whose record may be the subject of life-long criticisms and heart-burnings.

The Prussian soldier holds over from feudalism another inheritance, in close alliance with *Ehrenrath*, immunity from civil process. Many believe that the interests of justice would be greatly enhanced by a similar rule in our country. Certain it is that the soldier arraigned before a local civil court has to face a vast amount of prejudice; whilst in the other case, it is known that irregularities of the soldier which affect his civil surroundings are met with rigor by courts-martial.

The principal questions that occupy a Council of Honor (a kind of grand jury) fall under two classes—I. The cases where it is to be determined whether or not the *duello* shall be the arbiter. II. Where it is to be determined if charges and court-martial shall follow alleged acts.

In our country, in its present state of public feeling and of law, it is useless to consider the court's province in the first class.

The *Ehrenrath* might strengthen weaklings in an effort, through ostracism, to drive an unworthy man from a regiment, but such combinations would be very dangerous to the parties should civil law lay hold of them.

The vicious reappointments complained of by the author have no doubt lowered the tone of the Army, but it is not seen how a Court of Honor, helpless as against Executive power, could remedy this. As to recommendations to mercy by jurors, the present writer cannot agree with the author; charity and mercy will win in the end, if they be not used to screen unreformable vice. Still, it must be admitted that there is much injudicious sympathy. Yet, men of this softness of character are often known

to indignantly "cut" and ignore vicious parties, whom the stronger minded class tolerate freely till the opportunity comes to throw them overboard under the screen of court membership.

As to the oft quoted higher tone of the "old Army," it must be accepted with considerable qualification. That army was certainly more homogeneous, and being smaller, it was more easily ruled by a more quickly formed public opinion. But the "old Army" had its own scandals, selfishness, and unworthy perversions of duty. To ameliorate present evils probably the best way would be for each officer to bear himself toward an unworthy member as a high sense of duty should direct. Combinations are certainly dangerous, and a Court of Honor would be as likely to err *under an organized prejudice* as to reach truth or justice. Above all keep us from a regimental honor court. In a great majority of the matters that would fall under its investigation, long and complicated entanglements would render unravelling impossible, and it would leave resentments behind more embittering than the original situation.

An apposite case which may interest the present generation is that of old Major Martin Scott. Scott was a man of no culture, crude in his manners, and to the young fellows of his regiment painfully economical. A big Vermont boy, something in a service about the end of the war with Great Britain, procured him a commission, and on his transfer to the 5th Infantry, the regiment determined to get rid of this uncouth specimen. They heaped every insult upon him, till, without sympathy, he confined himself to his own quarters and lived surrounded by his guns and dogs, about the only creatures then left him to talk to.

As he persistently did not resign, at length a young officer, well advanced in consumption, determined as a parting gift to the regiment that he would challenge Scott and thus force on him resignation or a bullet. To the astonishment of most, Scott accepted the challenge as a great relief, and went out with an inimical second, and followed by just one sympathizing friend, his old negress cook. He came back as the admired shot of the regiment; they discovered in him heretofore unknown virtues of head and heart, his simplicity and economy of life became quite the boast. Marryat immortalized in story by the dialogue of Scott and the 'coon—"If you are Martin Scott, don't shoot; I'll come down." He feared nothing, and under a conviction of invulnerability performed wonderful feats of valor in Florida and Mexico; and after a life honored and beloved for its gentleness and truthfulness, in his mature days died gallantly leading one of the charges at Molino del Rey.

The present writer remembers another case of his personal acquaintance where an officer would have suffered heavily from any regimental opinion in his youth as an abolitionist. His challenges were sneered at because *he could get nobody but an orderly to carry them*. Yet this officer came out an honored man whose sword played no small part in the late Rebellion.

One reason why the "Court of Inquiry" is so unsatisfactory is probably that it is so seldom granted. Just in the cases where it might do the most good, it is oftenest refused; where the inferior suffers from imputations of the convening authority. But, after all, honor courts are intended more for matters not covered by the Articles of War, and a Court of Inquiry leaves out as much as possible, what may be termed socio-domestic questions.

As to the libertinism in the criticism of superiors, it is to be feared that in free America we will never be entirely free from it. The smallness of our Army (that "the Adjutant General can carry in his pocket") has something to do with this. Since the days of Old Organization himself to the young second lieutenant, the "Old Man" is an old fool, as is the ship's captain to the middy. The only corrective is probably good taste. Something may be hoped for from a greater regard paid by superiors to

intermediate authority. For a colonel to operate in a company without advisement of the captain, or for a general to operate in a post regardless of its commander, "are nuts to the juniors."

It is to be regretted that there could not be a code of honor planted in every officer's breast, to strengthen him in giving the cold shoulder to those acknowledgedly too base for their commissions, or in softer words to men out of their place. But it must not be forgotten that we are only human.

It is very desirable to keep our professional standard up to the demand of our master, the public. As some means to this end we might name :

1. Individual purity of character.
2. Constant readiness and fitness for the performance of every duty.
3. Respect for law.
4. Studiousness. Following a useful companion study to that of our profession is an excellent thing. Law, medicine, chemistry, electricity, mechanical engineering, finance, *vel al*, will make us more useful members of society while in service as well as upon retirement.
5. A hearty coöperation with the civic public of our immediate neighborhood in advancing local interests.
6. Closer inspections by the proper authorities as to the qualifications and conduct of officers and as to their attention to the fixed course of military studies.
7. Examination for promotion.
8. Enough men in the companies to make drills interesting and instructive.*
9. A determination on the part of every officer to help every new commander to carry out his policy of reform or advance, rather than a sullen holding to the old. In regard to this it may be safely said that the baneful examples of the Rebellion War have been many times duplicated in every post and regiment of the Service.
10. If the young in their criticisms of their superiors should always have a squibb at their elbow it might do them some good. Derby and General Nathaniel Lyon, then a captain of the 2d Infantry, were of the same mess at Monterey, Cal. Lyon, through some real or imaginary wrong received, was a bitter enemy of General Scott; never failed to abuse him on any and all occasions. The mess got tired of this. So, one day, when Lyon was in the midst of a tirade, Derby rested his head on his hands, and fixing Lyon with his eyes, said in low and measured terms: "Captain Lyon, don't you think General Scott would feel very bad should he know what you thought of him?" The laughter that followed was a salutary lesson to Lyon.
11. In some commands women have much to do with the insubordination. It reminds one of a battle of tortoises, each one hissing and stretching its neck to overtop the other. Officers might spend some of their time profitably in teaching their wives that civility to the wives of superiors will in no way compromise the rank of their ladyhood.

*It seems doubtful if we have improved upon Jethro in organization. Under his advice Moses divided Israel into tens, fifties, hundreds, and thousands, and appointed judges and chiefs over them—sergeants, subalterns, captains, and colonels—Num. xviii. The big German company gives an actual field-officer but captain's pay, and it is forced upon their service from the paucity of officers able to come up to their standard.

It would be strange, and it is not impossible that some of our bugle calls were those of Moses and Joshua. In the wilderness the movements of the host were directed by the trumpet, and as its notes are few, calls would be apt to be retained and transmitted if sufficiently distinctive.—Num.

III.

"Mackenzie's Last Fight."**First Lieut. O. W. Smith, 22d Infantry.**

I HAVE read Captain Bourke's interesting article on "Mackenzie's Last Fight with the Cheyennes," in the January and March numbers of the JOURNAL, also the comments upon the same in the March number, by Major Baird. The latter says: "The truth of history and justice to the troops engaged requires a correction in one particular." This very reason requires a correction in another particular—of action taken by troops cantoned at Glendive, on the Yellowstone River, and which seems to have been lost sight of. On October 10, 1876, an escort to a wagon train, consisting of four small companies of infantry, left Glendive for the cantonment at the mouth of Tongue River. That night camp was made on a creek about fourteen miles distant. At about three o'clock the next morning the camp was attacked, with a galling fire, by a large number of Indians, which attack was repulsed, but the mules became excited and many of them broke loose, over forty of them escaping from the corral and falling into the hands of the Indians. The train was so crippled and the Indian force growing so in numbers by recruits, that the command was compelled to return to Glendive. The Indians pressed them so that it was almost impossible for them to get out of camp. It was there that Captain Malcomb McArthur, 17th Infantry, now deceased, who had command of the rear guard, displayed courage and ability in bringing up the rear.

Upon the return of the train, Col. E. S. Otis, the commanding officer at Glendive, reorganized it (eighty-six wagons) and on October 14th set out with it for Tongue River, with a command consisting of Companies C and G, 17th Infantry, and G, H and K, 22d Infantry, 11 officers and 185 enlisted men. The following morning at 7 o'clock, this command was attacked by several hundred Indians. They acted in the most dauntless way, charging up near the skirmish lines, which had to be advanced a thousand yards or more from the train, to save the mules from their bullets. The Indians took a defiant stand in front, which had to be opened by repeated charges, and the rear was sorely pressed by them. This was kept up until 7 o'clock in the evening, when the command went into camp, having marched during the fight about twelve miles. The Indians attempted every artifice to defeat the troops and capture the train; they set fire to the grass, the fire running through the train, and they endeavored to advance under cover of the smoke; the soldiers also took advantage of it, advanced and took the Indians at short range. By the time the corral was made they drew off, seeming to be exhausted, remaining for the night, however, within sight and hearing. They could be seen by the light of the prairie fire riding around like so many devils. That night the troops lay in rifle pits surrounding the train, made with intrenching tools, which they carried; they were cheerful and happy after getting their coffee. No morning ever broke more beautifully than the next one. The Indians again in large numbers, and formed in solid masses, confronted the command. One of them was delivering an harangue, which in the still, clear morning, could be distinctly heard by the troops and understood by the interpreters. It was then, as the train advanced, that the following letter from Sitting Bull, written by one of his half-breed followers, fastened to a stick on the roadside, was discovered:

"YELLOWSTONE.

"I want to know what you are doing travelling on this road. You scare all the buffalo away. I want to hunt on the place. I want you to turn back from here. If

you don't I'll fight you again. I want you to leave what you have got here, and turn back from here.

I am your friend,

"SITTING BULL."

"I mean all the rations you have got and some powder. Wish you would write as soon as you can."

The commanding officer informed the Indians, through an interpreter, that he had nothing to say in reply, except that he intended to take the train through to Tongue River and that he would be pleased to accommodate them with a fight. The Indians did not fire a shot, and shortly afterwards a flag of truce appeared and a few of them were admitted inside the lines. They said they were tired of fighting and wished to conclude peace. Colonel Otis advised them to visit Tongue River for that purpose.

In Colonel Otis's report of this engagement, referring to the departure of the Indians bearing the flag of truce, he says :

"The train moved on and the Indians fell to the rear. Upon the following day I saw a number of them from Cedar Creek, far away to the right ; after that time they disappeared entirely. Upon the evening of the 18th I met Colonel Miles encamped with his entire regiment on Custer Creek. Alarmed for the safety of the train he had set out from Tongue River upon the previous day. I told him of the situation of affairs, and informed him that he would find the Indian camp either about the mouth of Cabin Creek or far away on his left travelling in the direction of Fort Peck. * * * In concluding this report I cannot speak too highly of the conduct of both officers and men. The officers obeyed instructions with alacrity and executed their orders with great efficiency. They fought the enemy twelve hours and fired during that time upwards of seven thousand rounds of ammunition. They defeated a strong enemy, estimated by many at from seven to eight hundred, who had defiantly placed himself across our trail with the deliberate purpose of capturing the train, and gave him a lesson he will heed and never forget."

This was the first fight of any moment that occurred after the Custer massacre. It was a decisive victory for the troops, dismaying the Indians to such an extent as to break their spirits and make them feel that they might as well give up hostilities, and no doubt led to the surrender of many of them.

FORT KEOKH, MONTANA, April 21, 1890.

IV.

An Episode of the Sioux Campaign, 1877.

By an Enlisted Participant.

THE massacre of General Custer and his troops had aroused such a spirit of vengeance that all the forts, in the far West, were in a state of excitement ; and every preparation was made for the coming spring campaign. Companies of cavalry were increased from sixty to one hundred, and everything was put in readiness for expected commands. So that when orders came in March to the commanding officer, Major Brisbin, at Fort Ellis, from General Miles, to join him at Fort Keogh for a summer campaign, all was bustle and preparation, and although we did not know where we were to go, or what tribe we had to fight, still Indians were at the end of the journey and a winter of comparative quiet gave a zest to the expedition. We left Fort Ellis the last of March, four companies of the Second Cavalry, F, G, H and L, Captain Ball commanding. Crossed the Divide of the Rocky Mountains to reach the Yellowstone, which we had to follow down to reach our destination. As we

had a pack-train and mule teams, six mules drawing a heavy wagon, and much camp equipage, our progress was necessarily slow and laborious. Some days we made a good march, while others were very small, as the spring storms at that season had swollen the streams to floods, and made ordinarily easy roads impassible. In addition to this raw recruits had to be trained and broken in; so that it was a full month of weary marching before we camped three miles from Fort Keogh to recruit both men and horses. After this needful rest, putting the soldiers and horses in good order, we passed in review before General Miles, who said it was as fine a body of troops as he ever saw and he would not hesitate to go anywhere with them. The 1st of May saw the troops and baggage train in motion up the Tongue River, a stream of about sixty-five or seventy yards wide, rising in the Bad Lands, and at that time very muddy and turbid from the recent freshets; and like all Western rivers, was thickly wooded at the water's edge. So wild and rugged was the country that the mules and oxen labored up the narrow valley of the stream with their creaking wagons. The command was composed of four companies of the Second Cavalry, together with some of the Fifth and Twenty-second Infantry. All save the officers were ignorant of the object and end of the expedition, except that some band of hostiles in some wild valley had to be surprised and conquered.

Five days we journeyed up the Tongue, the advancing spring covering up some of the bleakness of the landscape and spreading a green enamel over the bottoms of the valleys and the edges of the river. On the sixth day we left Tongue River to join the Rosebud, a much smaller stream, whose banks were profusely covered with the wild-rose, which at that season of the year was in full bloom. The sight, from a commanding hill, of this tributary winding in a serpentine way with its flowery borders, gave pleasure to the troops, who hailed with delight this vision of coming summer.

At noon an old Indian camp, which had been used during the foregoing winter, was reached; old bits of hide and fresh bones and meat showed that the camp-fires had been but recently vacated, and blackened brands looked as if they had been but lately burning.

Orders were given to dismount at the old camp, unsaddle horses, and take a rest. At the same time preparations were made for an advance. Other orders were issued to commissary sergeants to issue four days' rations to each man to be carried on the saddle; that is to the four companies of the 2d Cavalry who with the scouts and a few citizens were to form the party. A word here may be given to nondescript persons who always follow and are found on such a campaign. These are always the Indian guides, braves who constantly thirst for the blood and scalps of some tribe they are always at war with, and who would and could guide our troops to their mountain fastnesses. In this case they were Cheyennes, who were ready to put on the war paint against the Sioux. In addition to these were two half-breed guides, brothers, named Jackson, who combined the craft of the Indian to the intelligence of the white. Besides these were some citizens from Miles City who doubtless had some private grudge to settle, and some teamsters had also volunteered mounting their own mules; one of them afterwards proved himself to be quite a warrior mounted on his small black mule, showing much prowess and valor. The wagons, moreover, were left behind, the ammunition being packed on the backs of sure footed mules. Before the troops started, two scouts—one a Cheyenne, the other one of the half-breeds—went ahead, following the Indian trail over the mountain in order to locate the village. The troops started at two in the afternoon, marching carefully and silently. The way led through rough, steep defiles, with very insecure, perilous footing, so steep that one mule loaded with ammunition fell and rolled over into the abyss below. General Miles, with one or two scouts, went ahead and carefully looked over the crest of each hill

and mountain in the valley below while the troops halted. Then coming back a hurried consultation would take place before the column moved on again. Every precaution had to be taken to guard against the sharp eyes of Indian stragglers who might be prowling about the concealed village. The first scout not having returned. Just before dark the halt was made, and camp pitched on the slope of a hill. Strict orders were given not to make any fires, to avoid loud talking, laughing or singing. Horses were closely picketed, half lariat, every man having the order (if aroused suddenly) to go at once for the horses. A cold supper of bacon, hard tack and cold coffee was disposed of. Then every trooper laid down fully dressed, ready to be summoned at a moment's notice. Strict guard was kept until 2 A. M., when the word came to saddle up. It was confusing in the darkness of night to do anything silently and expeditiously. But without noise and confusion the silent, determined troopers marched off from two until five. During the night the scouts had returned with the news that the camp, unsuspecting of danger, was just ahead. They had viewed it from a neighboring hillock, and had watched for hours the Indians racing their ponies in the meadows below. Little did these wild jockeys of the plain think that ere another sun had set their steeds would be driven before their enemies and they homeless on the mountains. But to return to the silent column which was halted behind a butte which concealed but a few miles ahead. Orders were given to dismount, see to the saddles, tighten the girths, load revolvers, make everything ready for a speedy conflict. Advice also was given to the men to keep cool and firm, and not be too eager or hasty. General Miles then put Captain Ball in charge of the battalion, and then it was decided that Company H was to charge the camp, the other three companies following as reserves. Orders were also given that no two troopers should keep together, should pass through the village firing into the "tepees" as low as possible; then when beyond 500 yards dismount and close on the camp on foot.

Slowly the companies defiled around the butte, into the valley. Muddy Creek like a serpent rounded back and forth in many a turn, and beyond this natural watery defense lay the silent lodges, cold and grey in the light of the early dawn. No smoke curled up from the open tops, not a dog barked, and from a distance it might seem a village of the dead. When within two miles the word was given for the chosen band to charge, and dash through windings of the stream at a run, in order not to sink into the miry bottoms of the creek. Before the dashing troopers had covered half the distance the Minneconjous had taken the alarm, and were seen flying in all directions from their lodges, and scrambling up the steep sides of the mountains. Taken thus by surprise, they fled, leaving everything behind, and the yelling soldiers soon were in possession of the camp. As General Miles rode in an Indian confronted him with the word "How," keeping his blanket tightly wrapped around him. As the General gave the answer "How," he threw back the blanket, raised quickly a Winchester rifle, and fired. The motion warned the intended victim, who dodged quickly behind his horse's head, and the ball lodged in the heart of a trooper named Stringer, who was immediately behind. This man was one of the four that were killed in the fight, the other three being shot pursuing the flying hostiles in the mountains. It is needless to say this warrior paid at once for his temerity, his body being literally riddled with bullets. The Indians lost about fourteen, among them their chief, Lame Deer, who followed in the rear of the frightened women and children. After the fight was over the doctor cut off his head, and tried to borrow one of the camp kettles to boil this warlike trophy into a pathological specimen.

While the village was thus invaded and surprised, the other troops made a detour and surrounded the cavallada of ponies. These, of course, are of the utmost importance to secure, as the loss of their horses render the Plains' Indian comparatively harm-

less. The herd consisted of about four hundred and fifty ponies, the youngest and wildest of which were shot, while the older ones were used to mount the infantry—who thus found themselves suddenly mounted, but on not very docile or tractable steeds. As the herd was being driven together and the troopers and citizens were scouring the hills to dislodge any skulking brave, word was brought that a warrior was ensconced in a hole defending himself with his rifle; fearing he might prove a dangerous neighbor, several started to silence his battery. A few well-directed shots laid him in the dust, when from a low bush a figure rushed, waving what was thought to be a rifle, and making for the hills, a half-breed near by sent a bullet into its head. A wild leap and a plunging fall was the result, and then and not till then was it discovered that the flying brave was an aged woman with a long staff, who had been guarding her wounded son who had so desperately defended himself in his rifle pit. Thus it is that in every battle some one unfortunate thing happens that often mars a victory. When the scattered companies came together—had buried their dead, and looked after the wounded and bleeding—fire was put to the buckskin tepees, and soon the quaintly pictured wigwams were in flames. No doubt the owners looked on with rueful faces from distant points, and meditated dire revenge as they watched their smoking lodges.

A short march of eight miles from the scene of the battle brought the weary soldiers to their welcome camp, which, however, they were not to enjoy, as a drenching rain set in, and the late enemy followed the victors and poured into the camp a random fire through the night without, however, producing any bad results to horses or men, except making them keep up a ceaseless vigilance.

V.

"The Place of the Medical Department in the Army."

Captain James Chester, 3d Artillery.

LIUTENANT-COLONEL WOODHULL of the Medical Department seems to be dissatisfied with the title of surgeon, and severely condemns it in a paper which appears in the *JOURNAL OF THE MILITARY SERVICE INSTITUTION* for July, 1890. The chief objection to the title seems to be, that it is only semi-descriptive. He prefers and argues very ingeniously in favor of a military title for medical officers, but we hardly thinks he succeeds in establishing his case.

A medical man who receives a commission as assistant-surgeon in the Army, is at once invested with the rank of first-lieutenant, and according to Colonel Woodhull's views, should thereafter be addressed, officially and socially, by the military title. The colonel gives several reasons for this in the course of his paper, some of which we shall notice later on; but for the present let us confine our attention to the one already stated, namely, that the title of surgeon is only semi-descriptive. We shall not appeal to philology for the origin, history and meaning of any of the titles, medical or military, which appear in the case; or argue against the desirability of descriptiveness in titles, although much might be said in that line. We concede the desirability of descriptiveness for the sake of getting sooner to the point, and ask, wherein the title of assistant-surgeon is less descriptive than that of first-lieutenant? A lieutenant in the military service is, and always has been, the assistant of a captain; the assistant-surgeon would not be correctly described in that way. The title awarded in his commission is, if not more descriptive, certainly much more suggestive of the functions of his office, than the title which Colonel Woodhull would like to borrow from the line.

But, it may be said in reply, an assistant-surgeon of less than five years' service, is

legally invested with the rank of first-lieutenant, and has the right therefore to the title. Now, while we admit the rank, as legal and indisputable, we maintain that its character is tainted by the statute which deprives it of the full functions of command. It is not military rank proper, because of the limitations of the law, and was never intended to be. It is a kind of latent rank which legally adheres to certain commissions, and was put there, merely to protect the pocket and the dignity of the officer, and not to confer on him either place or title in the hierarchy of command.

Again, when five years' service entitles him to the rank, pay and emoluments—but not the title—of captain, he receives no new commission. The latent rank inherent in his original commission is legally increased so as to secure to him the dignity and emoluments awarded to captains of cavalry. But he is not a captain of cavalry, nor of anything else for that matter. He is simply assistant-surgeon, just as he was before.

And here it is pertinent to ask: What is it that confers a military title? A lieutenant may command a regiment and remain a lieutenant. To call himself, or even to suffer himself to be called colonel, even under such extenuating circumstances, would be arrogant assumption and bad taste. Manifestly command cannot confer a title. Again, an officer sees his nomination and confirmation to a new grade in the newspapers. Can he legally sign his name as of the new grade, or claim to be addressed by the new title? Certainly not, until he gets his commission or appointment from the President of the United States. The President confers the title in the commission or appointment, and whether it be descriptive of the functions which the officer is expected, nay warranted and commanded to perform, it is the only title which he can claim.

The question of title then is settled by the commission. If an assistant surgeon be a captain, he will be so designated in his commission, and commanded by that instrument to do all manner of things belonging to that grade. But if he is designated in that instrument as an assistant surgeon, and commanded to do all manner of things pertaining to that office, then his title is assistant surgeon, whatever dignity and emolument may be legally conferred on him.

The plaint of Colonel Woodhull that the title "Doctor," by which medical officers are almost universally addressed in military society, "means nothing," is a somewhat startling statement. Why! "Doctor" is supposed to be the highest degree in any of the learned professions, and has been the goal of professional ambition for centuries. But Colonel Woodhull says: "I fancy no one but a very young man takes much pride in this title as a title." And in another place he refers to "the sadly abused doctorate." How has this title of distinction, which has been proudly worn by so many eminent men, become so degraded as to deserve such language from a member of the doctorate? Perhaps Colonel Woodhull could answer the question. The line gives it up.

Admitting, however, that there may be something in this abuse of the doctorate to justify the young men of the profession in despising "the title as a title," surely the older members of the doctorate should be more conservative. It should be remembered that, in this country at least, every title has been abused. Think of the effect of saying "Good bye, Major," in almost any representative assemblage south of Mason and Dixon's line. Why! almost every livery-stable keeper, publican and gambler, in certain districts, is a major; that is, he seems to have the social rank of major, if common consent can be accepted as sufficient credentials. Then the hotel registers of Europe could furnish the names of dozens, aye hundreds, and perhaps thousands of generals, U. S. A., who, in all probability, had no more right to the title than Jack Bunsby had to be called Mikado of Japan. The doctorate has our sympathy. We also have suffered. But we have never seen a proposition to change

military titles on that account. No; let us stick to our titles; they are ancient and honorable, and fairly descriptive, and they have been borne by too many distinguished men for us to be ashamed of them. That they are sometimes illegally assumed only proves that they are honorable. The doctorate cannot be disgraced by quacks and charlatans any more than military titles can be by bogus officers. To be addressed as "Doctor" or "Colonel" is an honor or an insult, according as the title is or is not rightfully due.

But the want of descriptiveness in the medical title and the general abuse of the doctorate are not the only reasons which, according to Colonel Woodhull, make the substitution of the military for the medical title desirable. He seems to be particularly aggrieved at the designation "non-combatant" as applied to the medical staff, and appears to think that that objectionable designation would disappear if the military title was generally adopted. In order to justify his objection to the term "non-combatant," he produces an entirely new definition of it which can hardly be called satisfactory. He says "non-combatant seems meant to represent a passive agent," who is "mysteriously protected from all risk" and whose "duty is always discharged at the rear and in complete safety." Now, how this seems to Colonel Woodhull to be the true definition of a non-combatant is not apparent. It certainly is not the generally accepted meaning in military circles. A non-combatant is one who cannot be commanded to storm a breach or lead a forlorn hope. He may be a commissioned officer or an enlisted man; his functions may expose him to danger in the fore front of battle; but if he can claim exemption from such duties as those mentioned above, he is a non-combatant. Personal courage, ability and willingness to serve, have nothing to do with it. Duty alone determines the classification. The true test is not, Would you be willing to go? but, Can you be ordered to go?

Medical officers, as a rule, need no certificate of personal bravery. But if they did, the substitution of a military for a medical or surgical title would not supply the want. Men acquire military titles, with some exceptions, by processes entirely disconnected with personal courage, and cowards have been admitted to the hierarchy in almost every army. A military title, then, unless it be by brevet, awarded for special acts of gallantry, is the poorest kind of a certificate of courage. The brevet commission, however, is, or ought to be, such a certificate, and medical officers in our Army have reaped a harvest of them, which compare favorably with that of any corps in the Army.

There are some questions connected with brevet commissions awarded to medical officers, which have never been decided, because they never have been raised. A medical officer breveted a colonel in the Army of the United States, is undoubtedly a colonel, and, while brevet commissions were effective, eligible to command under the conditions imposed by the law. His commission as colonel by brevet in the Army, could not be vitiated in any way by the fact that he held a commission in the Medical Department. He sat on courts and boards by virtue of his brevet rank, and we can see no reason why he should be ineligible to command, by assignment of the President, while such assignments were legal.

There is another question in connection with medical rank which has slept ever since the War, but which was the cause of much controversy in former years, namely, the eligibility of chaplains, surgeons and paymasters to sit as members of courts-martial. The question turned upon the meaning of the words "commissioned officer" as applicable to persons eligible to sit as members of courts-martial. General Benét says, in his "Military Law and Courts-Martial": "In interpreting the words 'commissioned officer,' it has been the custom of service to exclude from that class all surgeons, assistant surgeons and paymasters, and indeed every one who is not clo'ed

with military rank proper, and having thereby an inherent right to command." The general is writing in relation to the words "commissioned officers" as applicable to persons eligible as members of courts-martial, and clearly states the customs of service before the War. The point upon which the custom rested seems to be that as the medical officer's commission did not confer the right to exercise the full functions of command, it was thereby tainted. In other words, medical officers were not members of the hierarchy of command, and were therefore ineligible to sit as members of courts-martial. The question had been referred to several attorneys general for their opinions, but the customs of service continued undisturbed until the Rebellion. Indeed it was the recognized and ruling custom of service as late as 1865.

But the War being over and the harvest of brevets gathered, many, indeed most medical officers had acquired a new status. Their brevet commissions gave them the right to the military titles therein awarded, and as they had thus become officers of the Army independent of their commissions in the Medical Department, the custom of service which had excluded them so long became inoperative. Medical officers were therefore placed upon the roster and detailed as members of courts-martial by virtue of their brevet rank.

The era of brevet rank continued sufficiently long to accustom the Service to the presence of surgeons and paymasters on courts-martial. Chaplains do not appear to have been admitted to the roster. Perhaps no chaplains were breveted, but if any of them were, and certainly some of them deserved to be, they would have had the same right to sit on courts that surgeons and paymasters had. But brevets were abolished, and everything should have reverted to the *statu quo ante*. The custom of service which excluded certain officers from courts-martial duty had not been abrogated by any law or new decision. It was still of force. But medical officers had gotten upon the roster under cover of their brevet commissions. The eye had become accustomed to their presence, and they continued to be detailed under their commissions as officers of the Medical Department, just as they had been under their brevet commissions. We do not claim that their presence is an evil; we only ask, is it right?

Colonel Woodhull assumes that his contention, "That in military life, the medical officer should be known by his military designation," is distasteful to the line officer. He says, speaking of the contention just quoted: "I know that this is a hard saying at its first expression to the most of the line." And perhaps he is right. But has he ever fairly considered why it is so? The tone in which he speaks of it, for there is tone even in a written page, would lead the laity to suppose that jealousy, or some baser sentiment, was the exciting cause. The bogus colonel certainly would think so. The honest indignation of legitimacy is always thrown away upon the usurper. Still the line would venture to ask, in justification, if it is absolutely certain that the military title is justly and lawfully due? If the line thinks it unwarranted assumption for any officer to claim a title other than that conferred in his commission, are they not justified in their indignation? The whole question, therefore, resolves itself, as already stated, into the simple inquiry, "Is it so nominated in the bond?"

We might very properly close this criticism here, for the keynote of the controversy is dealt with in the last paragraph; but we discover a statement further on which we cannot pass without comment. The colonel says that "under the law the President can make no man a colonel in the Medical Department." Precisely so. And therefore he does not do it. But, under the law, no one but the President can make a man a colonel in anything. Let the *ad captandum* statements answer each other. Colonel Woodhull knows the weak point in his case. He would like to prove that it is the law, and not the President, that confers the military title, and that, in the Army, rank and title are synonymous terms. We think he has failed, although he has suc-

ceeded in obscuring the main issue. The question is not "whether medical officers, after all, have any military functions?" as Colonel Woodhull says it is, but, "Have they, legally, any military title?" And it is wasting words to argue any bogus issue.

That medical officers in recent years have succeeded in surmounting the barriers which so long excluded them from courts-martial proves nothing. We have endeavored to show how all that came to pass. But a seat at table did not save the man who was without the wedding garment. That he was there was no proof that he was rightly there, and it is just so with the medical member of a court-martial.

The attempt to prove that the functions of medical officers at military posts partake, in a degree at least, of the character of command, because they "originate work" which has to be executed by the garrison, needs no comment. Indeed, everything the colonel says on the subject goes to show that the functions of a post surgeon, even in matters of post sanitation, are purely advisory and not commanding, and that his legitimate functions in peace and in war, although very important and their execution attended with great risks and grave responsibilities, are never military.

Captain Gilbert P. Cotton, 1st Artillery.

Two points in the paper by Brevet Lieut.-Col. A. A. Woodhull, M.D., on "The Place of the Medical Department in the Army" (July number), strike the professional military person somewhat peculiarly. "One condition," says Surgeon Woodhull, (p. 561) "that seriously detracts from his official prestige in a military community is the necessity for the medical officer's presence in the discharge of his duty. The panacea for other officers—to issue an order—will not compass the end; and in a society where the junior generally waits upon the senior the obligation to reverse the procedure tends to diminish respect in unreflecting eyes." From what facts or by what course of reasoning he arrives at such a conclusion would be somewhat difficult for the "liner" to understand. It is not known, for instance, that the first sergeant of a company reports the results of a roll-call to a lieutenant at the latter's quarters, or that this officer feels it a loss of prestige to receive the report "in propria persona" on the company parade, however inconvenient it may be at times. Nor does he feel his dignity greatly injured when he inspects the kitchen and interrogates the cook as to the quality of the food. It would be thought a strange perversion of fancy, even "in unthinking minds," that the captain of a company could lower his dignity by visiting his office and listening patiently to complaints, often ill-founded, of ignorant men who imagine they have a grievance, or when he attends personally to many other things not altogether agreeable, but which conduce to the comfort and efficiency of his men. Nor is it known that the commanding officer of a post can solace himself with that "panacea to others—an order." It is usually believed that even he must be "present in the discharge of his duty," though this duty involve waiting on his juniors, as when he inspects the guard-house and prison-rooms and the not altogether pleasant prisoners therein.

Indeed it is generally thought by these "other officers" that to perform duty by proxy—the panacea of an order—would have exactly the contrary effect to that described by Surgeon Woodhull, and if carried too far would be apt to cause something more than passing comment from military superiors.

There is no corps where undue stress laid on the question of rank by its officers can work such detriment, if not cruelty, to those around them as the Medical Corps. Obtaining his promotion with a rapidity out of all relation to that of line officers, the medical officer habitually finds himself ranking the majority of those among whom he serves.

To lay stress on a supposed loss of prestige in professional attention on officers

who, though junior in rank, may easily be senior in years and in service, seems slightly ungracious—if nothing else.

It has happened more than once that a line lieutenant has seen a stripling in short clothes tumbling about his quarters, who, later on, entering the Medical Corps, has beaten the elder in the race to a captaincy.* Shall it be considered "in a society where the junior generally waits upon the senior" that this stripling who is junior to the other in years, in experience, in honorable service, in every attribute that goes to make an officer, and who has won his promotion, not through superior merit, but by a fortuitous circumstance—the survival of conditions that no longer exist—shall it be considered that this one has lost in military prestige or that it "diminishes respect" in reflecting or unreflecting eyes for him to attend at the bedside of that other if necessity demand it? Heaven help those of us who are on the plains and can obtain no other aid, if it does.

If the medical officer desires a military title and the same footing with other officers in this regard, let him earn it as "these others" do—by length of service and "weary waiting"—and no one will begrudge it him. Further down the same page the author states: "But these minor matters would have no value, did they not tend by their conspicuous and more common character to leave an impression upon military society greater than that made by the grave public duties discharged without publicity, and thus to bring the gratuitous family physician and general convenience theory more glaringly to the front."

Paragraph 1634, A. R. states that: "Medical officers, where on duty, shall attend officers and the enlisted men and their families." In the face of so clearly defined a duty, it is difficult to understand how this officer can intimate that there is a theory abroad that he is dispensing a gratuity.

When an officer finds his horizon becoming so filled with the idea of rank and military precedence that other things are dwarfed by comparison, it would seem high time to suggest the panacea of one order—Halt!

* The medical officer enters the Army a first lieutenant with the pay of a mounted officer and obtains his promotion to a captaincy, without examination, after five years' service. Other officers enter as second lieutenants, and in the line wait usually from five to seven years for promotion to first lieutenant, and about fifteen years to a captaincy.

Reviews and Exchanges.

Submarine Mines in Relation to War.*

MAJOR CLARKE is very favorably known to military engineers of this country from his writings on fortification, experimental firings, etc., and anything from his pen at once commands attention. In this paper he appears in what for him is a new field, and if his views do not meet full acceptance on this side of the Atlantic, it is perhaps because the conditions which he discusses are not our conditions. He treats submarine mining from the point of view appropriate to a nation having command of the sea ; we look at these auxiliaries as the best obstruction to channels dependent on land defenses for immunity against hostile fleets more powerful than our own are now, or are likely to be for at least a generation. In discussing his paper critics must beware of the error of the two knights of old, who maintained *à outrance* that the shield was wholly gold or wholly silver when, in truth, they knew only one side.

Major Clarke waives all technical treatment of submarine mines, and considers (1) their fitness for defending harbors of varying classes ; (2) the validity of certain historical claims ; (3) the relation of this branch of defense to others, and (4) the extent to which the system is applicable to British requirements. Only the first three questions concern us.

Under the first head he cites the Chatham text-book of 1873 as going too far, by claiming submarine mines as universally applicable to the defense even of unarmed towns, open beaches and cramped waters commanded by fire. In this American engineers will certainly agree ; with us, cover by land guns forms an essential part of the system, and where that fire cannot be escaped no mines are required.

Under the second head he argues that the advocates of submarine mines hold that the teachings of the American and of the Franco-German wars constitute proof positive of the value of the system, that it is cheap, and that the moral effect is enormous. He takes the position that "the first will not stand any examination whatever, the second depends wholly upon what is understood by a mine defense, the third is a matter of circumstance and opinion."

Here issue may fairly be joined. Major Clarke estimates the destruction in the War of 1861-65 at 21 vessels sunk and 3 more seriously injured. The true figures (omitting, of course, damages by spar and coal torpedoes) are 28 vessels sunk, of which 7 were ironclads ; and 6 vessels seriously injured, of which 1 was an ironclad. Moreover, of these casualties 1 occurred in 1862, 5 in 1863, 12 in 1864, and 16 in the first half of 1865, showing the rapid development of the system, defective as it always was in our estimate of to-day. Had it been as perfect at the outset as it was at the close of the War, and had we been able to push hostilities as vigorously (both of which

* *Submarine Mines in Relation to War.* By Major G. S. Clarke, C. M. G., R. E., Woolwich. Printed at the Royal Artillery Institute. 1890.

are implied in Major Clarke's reasoning), the loss in the four years should fairly be estimated at $16 \times 8 = 128$ vessels. He very truly states that the circumstances of the Confederate States were so different from those of Great Britain that no parallel can be assumed; but from our point of view (possessed of no armored fleets), the record may encourage us to believe that a hostile fleet appearing on our shores would receive a startling welcome.

Touching the ability of fleets to run past modern batteries, without accepting the somewhat radical negative position taken by Major Clarke, we may agree that such an operation would hardly be attempted unless clear water lay ahead; but as most of our chief ports offer this inducement to a dashing enemy we prefer, pending a war trial of position finders, rapid-firing guns of large calibre, etc., to place what we believe would be an effective barrier in the path. Probably Major Clarke would do the same at ports like Melbourne, were he required to prepare to receive a powerful naval attack. We contend that fleets cannot expect to engage modern land batteries successfully on anything like equal terms as to armament; but the running past when the channel is good and the light unfavorable to artillery practice is a different matter, and where the land forces have to depend on their own resources mines are of immense value.

As to the cost of an effective submarine mine defense, a point which the pamphlet before us raises, but hardly discusses, a few words may be pertinent. The Board on Fortifications or other Defenses recommended a liberal use of this obstruction in our 27 chief ports,—covering in all of them broad expanses of water lying under the fire of land guns; and the cost, including mines, operating casemates, electric lights, etc., was only about three and a half per cent. of the whole outlay required. In fact, it was less than half the cost of the torpedo boats added as a measure of precaution. The claim of cheapness can certainly be stoutly maintained.

It is perhaps a delicate matter to discuss the moral effect of the belief that a mined field lies ahead, when the officer is in command of a war-ship that he knows to be important and perhaps essential to the success of the fleet; but it should hardly be dismissed as "a matter of circumstance and opinion." Some men may push on regardless of consequences whether the act upon the whole be judicious or not; but it is believed that the responsibility would weigh heavily upon the majority. As to this matter we may consult history with some confidence. Major Clarke does so freely in treating the question of ships running past modern fortifications, although in the absence of any crucial test the same logic would discredit position finders, rapid-firing guns, and other modern devices; but he scarcely refers to Charleston, which is a case very much in point. No one for a moment will impugn the conduct of our naval officers there, yet it is a fact now established on indisputable evidence that the channel was not blocked with torpedoes prior to the winter of 1864-65, and that the mechanical obstructions were of a very imperfect type. Nevertheless, "the ironclad squadrons of Rear-Admirals Dupont and Dahlgren were as effectively stopped for more than two years by fear of these as by anything else." It has been aptly said that the torpedo "attacks both matter and mind," and its advocates are not likely to yield either claim, while the War record stands and human nature remains unchanged.

There are many ideas in Major Clarke's paper which will command universal assent, and it is well worth the perusal; but so much of his reasoning is inapplicable to a nation like ourselves, possessing little sea power, that it has seemed better to devote the limited space to points of difference rather than to points of agreement.

H. L. A.

The Defense of Charleston Harbor.*

This book will take a distinguished place in the permanent war literature of our great struggle. The volume contains about 450 pages, and appears in a neat dress, well illustrated with maps, views and portraits; and it is a pleasant sign of the times to find among the latter excellent likenesses of Admiral Dupont and of General Gillmore.

The author served as Engineer-in-charge at Fort Sumter during the greater part of the siege, except when absent by reason of wounds, of which he received two at different dates. The scope of the work cannot be better stated than in his own language: "The constant aim has been to write a history which will be deemed worthy of its subject, without either falling into the dryness of the chronicler or lavishing on persons and things the superlatives of the war correspondent. Having preserved all my private notes, sketches, and diary, together with the Engineer's official journal from July 20th to September 2, 1863, and my reports made almost daily to the Chief Engineer, and having also been aided by the authoritative materials for history printed since the War, I have had the satisfaction of writing what is as nearly an official narrative in point of accuracy and fulness of particulars as could be desired." It might be added truthfully that by a skillful adjustment between text and appendices he has presented all the details needed by the student without interrupting the interest of the narrative.

The narrative covers the operations on Morris and James Islands, and others, but naturally interest centres at Fort Sumter, which in history is the wounded lion of the War. What General Gillmore did on Morris Island has long been known; what Admiral Dupont and Admiral Dahlgren did with the armored fleet is all on record; what was occurring in Fort Sumter has remained until now buried in mystery. The world without saw the brick walls crumble and the new ramparts rise, but woe to the assaulting party which sought to investigate within. Since the War silence has shrouded the ruins and their story.

The veil is now raised, and we behold the garrison busy in the labors of preparation and repair, or braving the dangers of three principal and eight minor bombardments, during which 3500 tons of metal were thrown against the fort and 2400 tons struck the mark. Now falling ruins crush a party of men asleep; anon the accidental explosion of a magazine spreads destruction in every direction; frequent casualties, broken rest and weary labors mark the days as they pass. During the great naval attack of April 7, 1863, two shells—a 15-inch and an 11-inch—passed through the weakest part of the scarp and exploded on the parade. How this weakness was corrected before the land guns began their still more destructive work is explained in full. "The fiction of Fort Sumter's being protected by the spontaneous or fortuitous piling of its own debris, has been pointed out and corrected in these pages. Foresight contrived and hard work executed the plans of defense." The skillful manner in which this was accomplished should be known to every engineer and artillery officer, who in the present condition of our sea-coast defenses may at any time be called upon to make practical use of the knowledge.

But this brave garrison was not content to remain quietly at home. After they had sunk the *Keokuk* and she lay four miles away, off the southern extremity of Morris Island, with "the turrets just visible above water at the latter period of the ebb tide," and after reconnoissances by Confederate naval and army officers had decided

* *The Defense of Charleston Harbor, including Fort Sumter and the Adjacent Islands, 1863-1865.* By John Johnson, formerly Major of Engineers in the Service of the Confederate States. Charleston, S. C., Walter Evans and Cogswell Co., Publishers, 1890.

that the recovery of the guns was impossible, the garrison did not allow the matter to rest. A gang of skillful mechanics was organized to work many dark nights in cutting through the massive iron of the turrets and clearing the two 11-inch guns, each weighing 16,000 pounds, from the wreck. "The enterprise was conditioned and limited by the following necessities, viz.: darkness, secrecy, quiet, short time, smooth water, and perpetual vigilance," for "the Union fleet lay outside, and even some of their small boats on picket duty could be descried from the deck of the *Etiwan*." Space is lacking to follow the narrative, but when "the last bag of sand had been transferred and human ingenuity can do no more," when "the first streaking of the eastern sky with the early dawn is discovered," and there came at the last instant to relieve their despair "a friendly wave from the ocean, swelling landward, and lifting the hulk higher than before, lifting the spars and blocks, lifting the muzzle of the gun from its detaining lodgment, and lifting the hearts of all these waiting men from the depths of painful suspense to joy and satisfaction," the reader, whether he wore the blue or the grey, cannot but feel a thrill of genuine sympathy with these gallant American soldiers. By this exploit were procured the two most powerful guns mounted on the defense of Charleston.

The book is by no means a simple narrative of events. It abounds in thoughtful comments upon the various operations; among them is a criticism upon the attacks upon Fort Wagner, including two desperate assaults, a bloody siege, and the loss of about 2400 Union soldiers. It will be remembered that Fort Sumter was effectually silenced by the breaching batteries two weeks before the evacuation of Wagner. Major Johnson considers that: "Two flotillas, one worked every night from Vincent's Creek, and the other from the fleet lying off Morris Island co-operating with it, could have settled the possession of Cumming's Point without the bloody repulses before Wagner, without the long delay of the siege, and with the *éclat* of a captured garrison." The plan was favorably mentioned in the correspondence between the Union commanders, and the wonder is why it was not adopted.

A concluding sentence of the author forms a fitting close to this notice and gives a fair idea of the spirit in which the work is written: "From a due consideration of the many facts which have been summarized under the foregoing heads, it is hoped that all minds will be enabled to form a true estimate of the Confederate defense of Charleston Harbor. After all, the verdict of posterity will be the surest. It may not yet be full time for mature opinion, but already the passions of the combatants have cooled and their judgment of one another is becoming yearly more just and more generous. The North has impressed the South with respect for the National idea—a motive new and strange to the latter, but destined in the providence of God to lead both sections, united in one people, to higher and grander achievements as the years roll on. In that period of national greatness it may happen that due credit will yet be given to the formative and conservative value of Southern principles, as old as the foundation of the Union itself."

H. L. A.

Journal of the U. S. Cavalry Association.*

"Better and better" is the verdict we gladly pass upon the *Journal of the United States Cavalry Association*.

Each number has its own peculiar merit, and each seems to be a trifle of an improvement upon its predecessors.

The discussions carried on in its columns show an increasing and an intelligent

**Journal of the U. S. Cavalry Association*, No. 9, Fort Leavenworth, Kansas.

interest on the part of officers of the mounted service in all that pertains to the military profession at large as well as to the specialties of their own branch of it.

We have always felt that the multifarious duties falling to the lot of the cavalry-man on our remote frontier; to-day, in command of a company; to-morrow, marching with recruits to be distributed among the posts of a department; next week, perhaps, in charge of all the administrative bureaux, the adjutant's, the quartermaster's, the commissary's, of his station; and still later, in charge of Indian scouts following the dangerous trail of hostile Indians, as subtly treacherous and ferocious as so many tigers; or else on duty at or near agencies, where the most delicate management and most unerring judgment were needed to anticipate trouble, allay suspicions, engender good feeling and prevent outbreaks, could not fail to develop in the men physically capable of graduating in such a training school, the skill, coolness and mental balance essential to the generals of the future.

We are glad to see that this wealth of experience is not to be hoarded by individual possessors, or blindly allowed to go to waste. It is a treasure which cannot soon again be accumulated. The Indian tribes have ceased to be a menace, and may soon cease to exist.

It is well, then, that the task of comparing, sifting out and classifying this wealth of knowledge and experience, a task for which the *Journal of the Cavalry Association* is so well adapted, has been begun in good season and in good earnest. J. B.

Instructions for Courts-Martial and Judge Advocates.*

This thin volume is, to all intents and purposes, a reprint, with some additions, of a dozen predecessors. The additions are mainly to be found under the head of "General Instructions," and are excellent in their way.

In every new issue of this valuable *Vade Mecum*, the chapter containing General Instructions grow visibly larger, until there is danger that the utility of these pocket digests will be whelmed and drowned beneath the flood of superfluous detail. Winthrop's luminous—voluminous—work on military law is scarcely a handy book for the trial of a case. Let no future "Instructions for Courts-Martial" exceed the limits of the sixty pages under review, under the penalty of being classified with that massive work, and neglected in favor of some less pretentious and more flexible rival.

This little compilation by Captain Ray contains all that can be needed for the satisfactory trial of the average court-martial case; a good deal more than is required for most of them. Though of local authority it is of general application, and will add to the reputation of the compiler as an intelligent and painstaking officer.

H.

History of the Seventh Regiment of N. Y.†

This able work published by the Seventh Regiment, and more particularly intended for circulation among the many friends of this celebrated corps, has a still wider scope in the intrinsic value it possesses for the military reader as a compendium of the growth of the militia of New York State under the various laws which have been enacted for its proper organization and discipline.

Commencing with the Dutch colony of New Amsterdam in the year of 1609 and continued up to the present time, the author presents an exceedingly interesting account, illustrated by excellent wood cuts, of the laws, customs, uniforms and disci-

* *Instructions for Courts-Martial and Judge Advocates.* By Captain P. Henry Ray, Acting Judge Advocate U. S. Army, Omaha, Neb., March 1, 1890.

† *History of the Seventh Regiment of New York.* By Emmons Clark.

pline ; and while the regiment is always in the foreground, yet it stands there from its merits, for the impartial soldierly spirit of the author gives due credit to other organizations.

It is a frequent remark that the military forces of the State at the present time partake too much of a social character to enforce proper discipline, but be that as it may, a retrospective view shows the great advance which has been made in matters of discipline by citizen soldiers.

An example occurring in 1840 will show this, and at the same time, the beneficial influence the regiment was then exerting.

It was at that time proposed to organize a club or association for the purpose of giving the general commanding from time to time, suggestions, hints, or perhaps instruction, as to what he should do, and to demand pay for an occasion when not actually ordered out. The officers of the 7th (then the 27th) were invited to co-operate, but declined, coming to the sensible conclusion not to interfere with the general in giving unasked for advice, and in not demanding pay for services not rendered. It is such a spirit as this that must have enabled these officers to build the foundations of the splendid organization of the present time.

Not the least interesting reading is the conduct of the regiment during the riots and civil disturbances in which it was called under arms, and while General Clark has displayed a soldierly brevity in all his writing, yet, perhaps, it is to be regretted that he has not given us more particulars of these occasions ; for the treatment of mobs has always been a problem of great interest to all engaged in the profession of arms.

The list of active service is a long one, as is shown in the following :

- In 1849 Astor Place or Macready riot.
- " 1857 Metropolitan Police riot.
- " Dead Rabbit riot.
- " Mackerelville riot.
- " 1859 Quarantine " war."
- " 1861 U. S. service at Washington.
- " 1861 U. S. Guard duty at East New York, and U. S. Service at Baltimore.
- " 1863 U. S. Service at Baltimore and Fredericktown, draft riot.
- " 1871 Orange riot.
- " 1877 Labor & R. R. riot.

The historian takes proper pride in recording the services of the Seventh when serving under the United States' flag. That the prompt response when called upon to perform military duty, beyond the boundaries of the State, was of great benefit in moments of emergency, is on record at the War Department, independent of this, a most excellent example of promptness was afforded to the other regiments. But the genuine military strength of the organization was most thoroughly tested when there was furnished from its ranks some six hundred officers to the United States and yet it recruited to full ranks again with the same class of young men.

A warm love seemed to have always existed between these cadets from the regiment and their successors ; and to this day the war veterans refer with pride to their " Military Mother," while the regimental records give full reverence to the memory of those comrades who fell on the battle-field under the folds of other regimental flags and to the survivors.

This record of soldierly duty, faithfully performed, has endeared the Seventh to the public and presents an example of discipline for other organizations, throughout the United States, to follow. How that discipline has been arrived at by the exertions of a succession of good field and line officers for the past fifty years is here presented for the young officers of this day to read and ponder over. In the words of the Dedi-

cation, "to inspire the young men of New York to imitate the example of those who built the regiment up." The National Guard maxims presented at the close of the work are valuable and suggestive.

That Col. Emmons Clark stands pre-eminent among all the excellent commanding officers of the Seventh regiment is without question, but no one officer nor any succession of commanding officers could have accomplished what has been done, if not supported by efficient line officers; and the services of such line officers were only secured by the wise exercise of the elective privileges by the privates of the Seventh regiment.

Popularity with them has never been permitted to crowd ability to the rear, and if it be possible to extend that judicious use of the ballot throughout the whole National Guard the vexed question of the "election" of officers would be solved and the full military value and strength of the militia would be arrived at. The history of this regiment is, however, before the public, showing that the success obtained did not depend upon the life of any one individual, but the whole was maintained by a judicious system. There is no doubt its ranks are, and have always been filled with gentlemen suitable for officers, who, if they possess the ability, come to the front; like King James' spearmen :

" Each stepping where his comrade stood,
The instant that he fell."

General Clark after thirty-two years' service in which he achieved such splendid results now crowns his labors with an admirable history of the regiment, and perhaps the most concise criticism of the work which can be made will be in likening it to one of the dress parades under his command; working smoothly, its parts complete, exact and orderly in the whole; and full of interest to the observer, be he professional or citizen.

The committee of publication has produced an unique work, the type, illustrations, paper and style are perfect in their way, while too much praise cannot be awarded the author for his admirable system of compilation, careful research and the interesting manner in which he presents his subject to the public.

E. L. M.

New York and Vicinity During the War of 1812-15.*

The antiquary will find in this book a treat prepared, with painstaking accuracy, from ancient records well-nigh unknown to the generation which throngs the streets of the great city to-day. The local changes which have occurred during the past three-quarters of a century seem incredible. The population was then about 98,000 persons, of whom about 1500 were slaves. Of aliens there were about 3000, English, Scotch, French and Irish; Germans were almost unknown. Commerce was the chief occupation. The southern part of the East River front was the chief seat of the foreign trade. Pearl Street was the principal mart. Broadway, below Leonard, and Greenwich Street were favorite localities for residences. Canal Street from the Hudson River to Centre Street was an open sewer, with not a house on its borders, and with only a few scattering buildings to the northward. There were only two bridges crossing the stream, one of stone at Broadway, and the other at Greenwich Street. On the East side, North Street (now Houston) marked the city limits, all beyond being esteemed country.

* *New York City and Vicinity During the War of 1812-15*, being a military, civic and financial local history of that period. By R. S. Guernsey. Vol. 1. New York : Charles L. Woodward, bookseller, 1889.

One mail a day, each way, with a schedule time of 36 hours, connected the city with Washington : postage then varying from 8 cents to 25 cents per sheet, according to distance.

The fortifications of New York, very fortunately for the city, had not been neglected. Preliminary surveys and projects were completed in 1794 by Charles Vincent, a French engineer, and these exerted an important influence on the constructions. Lack of funds postponed the work until 1800, when it was commenced with State funds expended under the direction of the general government. In 1805 Colonel Jonathan Williams made a new survey and report to Congress, and work was actively begun in 1807, also with State funds. The fortifications and armament in position at the outbreak of the War were the following : In the city, South West Battery, later called Castle Clinton, and now Castle Garden, built about 1811, 28 guns ; North Battery, off Hubert Street, three blocks below Desbrosses, later called Red Fort, 16 guns ; on Governor's Island, Castle Williams, 78 guns ; Fort Columbus, built in 1807, 60 guns ; on Bedloe's Island, mortar battery and star fort, 24 guns ; on Ellis Island, 14 guns and 4 mortars ; on the Staten Island side of the Narrows, Fort Richmond, Fort Morton, Fort Hudson, and Fort Tompkins, incomplete, 60 guns. Total, 280 guns, mostly 32-pdrs or smaller calibres, and 4 mortars. There was no fort on the Long Island side of the Narrows, except an earth work (20 to 30 guns) near the site of Fort Hamilton ; nor at Sandy Hook, nor at Hell Gate. Other works were begun or completed during the War ; Fort Gansevoort, near foot of the street of that name ; an earth work on the Battery Park, South Battery on Governor's Island, Fort Lafayette, and works on Sandy Hook and Navesink Highlands. Also "a line of torpedoes was anchored at the Narrows ready to be stretched across the channel at short notice, so as to blow up vessels passing by the forts."

Such was the theatre of operations in this vicinity in 1812-15. No attack was made upon the defenses, which thus fulfilled their object in the best possible manner ; but an annoying blockade was maintained for several months. The operations of the garrison at Sandy Hook and the Highlands were confined to boat attacks on small craft and to securing, in defiance of bombardment, the cargoes of vessels driven ashore by the British fleet, exploits both dashing and amusing.

The chronicle before us gives a lifelike picture of the times ; the inspection of the troops (at first about 3500 men), their uniform, target practice at the Battery and at the Narrows ; fitting out privateers, complimentary balls and banquets with their toasts, thirteen in number, corresponding to the number of the original States, at Federalist, and eighteen at Democratic dinners ; complimentary resolutions of the Common Council ; protests against the inadequacy of the defenses, one in company orders by a militia captain condemning the Government "for their weakness and folly in plunging us unprepared into this quixotic war," for which he was tried and acquitted by court-martial, although the finding was disapproved ; the abandonment, not without a struggle, by the Tammany Society of their habit of wearing Indian dress in celebrating the 4th of July, on account of current Indian atrocities in the Northwest ; accounts of torpedo and other operations on Long Island Sound ; echoes of events in other parts of the country, and finally the financial and other effects of the War.

Mr. Guernsey has succeeded in presenting a series of quaint pictures of our National infancy ; and the reader will rise from the perusal with an appreciation of the research and time devoted to what with him has plainly been a labor of love.

H. L. A.

Reloading Implements.

Referring to the advertisement of the Ideal Manufacturing Co., New Haven, Conn., we may say that while it is very convenient to obtain loaded cartridges it is also desirable for many reasons to load and reload our own at home. It is also much more economical, if one has time and inclination to do so. The "Ideal" Manufacturing Co., of New Haven, Conn., makes an excellent outfit for reloading. The making of good bullets is to many a difficult task, but it is very simple and easy if one has good tools to work with. First, an "ideal" dipper is required; next, a larger vessel for containing the lead. The dipper is used only for pouring the metal. It gives it "head," or pressure, and forces out the air, and fills up the mould completely, if the mould is kept at the right temperature.

FOR REVIEW.

Grant versus The Record. By Col. Carswell McClellan. Houghton, Mifflin & Co., 1890.

Practical Information for Non-Commissioned Officers on Field Duty. By Brevet Lieut.-Col. Guy V. Henry, U. S. Army.

Submarine Mines in Relation to War. By Major G. S. Clarke, C. M. G., R. E., 1890.

The Defense of Charleston Harbor, including Fort Sumter and the Adjacent Islands, 1863. By John Johnson, formerly Major of Engineers in the service of the Confederate States. Charleston, S. C. Walker, Evans & Cogswell Co., 1890.

Recollections of General Grant, with an Account of the Presentation of the Portraits of Generals Grant, Sherman and Sheridan at the U. S. Military Academy, West Point. By George W. Childs. Philadelphia, 1890.

A Catechism on Cavalry Outposts, Reconnoissance, Patrols, and Advance and Rear Guards. By E. A. Garlington, 1st Lieutenant, 7th U. S. Cavalry.

New York City and Vicinity during the War of 1812-15. By R. S. Guernsey. Vol. I. New York, 1889.

OUR EXCHANGES.

ARTICLES OF MORE OR LESS MILITARY INTEREST.

ARGENTINE REPUBLIC.

Boletin del Centro Naval (March, April).

BELGIUM.

La Belgique Militaire. Study on Our Cavalry. A Visit to the School of Ypres. 75th Anniversary of the Battle of Waterloo. Cupolas on the Meuse. Military Examinations. Mounted Captains in Infantry.

Revue Militaire Belge (To date).

ENGLAND.

Proceedings of the Royal Artillery Institution. (June, 1890.) Submarine Mines in Relation to War. Odd and Scarce Books on the Military Art. The Mexican Army. Ancient Portuguese Ordnance. (July) Fire Control in Fortresses. Instruction of Army Signallers in Observing and Reporting Ships.

Publications of the Aldershot Military Society. Fundamental Principles of Cavalry Drill.

The Illustrated Naval and Military Magazine. (June, 1890.) Epochs of the British Army.—VI. Great Commanders of Modern Times. Napoleon. Naval Warfare. XII. The Russians in Hungary, 1849. On Increasing the Fighting Power in Ships of War.

Army and Navy Gazette (To date).

United Service Gazette (To date).

FRANCE.

Revue Militaire de L'Étranger. Modifications Proposed in the Artillery Organization of Austria-Hungary. The Organization of the Higher Commands in the Russian Field Army. The Persian Army. Military Schools in Russia. The Artillery Combat in Siege Warfare.

Revue du Cercle Militaire. The Mobilization of the Fleet and the English Naval Manœuvres. The Foot Manœuvres of the Russian Dragoons. Mountain Artillery. The English Torpedo (Brennan).

Le Progrès Militaire (To date).

INDIA.

Journal of the United Service Institution of India, Vol. 19, No. 80. Recent Ideas on Fortifications. The Company as the Tactical Unit of the Future. The Effect on Cavalry of Recent Improvements in Fire-arms. Training of Russian Company Officers in Central Asia.

ITALY.

Revista di Artiglieria e Genio (May and June, 1890).

NEW SOUTH WALES.

United Service Institution of New South Wales. The Defense of a Protected Harbor. Harbor Defense by Guard-boats and their Duties. Round about Apia, Samoa.

SPAIN.

Memorial de Artilleria (May and June, 1890).

UNITED STATES.

The North American Review. (July, 1890) The Emancipation of the Family. Summing up the Tariff Discussion. The Prince of Wales. Railway Men in Politics. (August) Our Army and Militia. Recent Progress in Theosophy. American Influence in China. In Westminster Abbey. The Capture of Canada.

The Popular Science Monthly. (July, 1890) Greenland and the Greenlanders. The Musical Sense in Animals and Men. Human Heredity. Commercial Geography of South America. (August) Missions and Mission Indians of California. Common Sense applied to the Tariff Question. Sanitary Work in Great Disasters.

St. Nicholas. (July, 1890) The Baby a Prisoner of War. The Armorer's Errand. Six Years in the Wilds of Central Africa. (August) A Lesson of the Sea. A Remarkable Boat Race. Six Years in the Wilds of Central Africa.

Harper's New Monthly Magazine. (July, 1890) Some Colonial and Revolutionary Letters. Texan Types and Contrasts. Treasury Notes and Notes on the Treasury. Baltic Russia.

The Century. (July, 1890) The Autobiography of Joseph Jefferson. Nathaniel Boem, the Patriot of 1676. A Yankee in Andersonville. The Inside Facts of Lincoln's Nomination. Bloodhounds and Slaves. (August) The Perils and

Romance of Whaling. The Autobiography of Joseph Jefferson. An Artist's Letters from Japan. A Yankee in Andersonville. The New School of Explorers.

Magazine of American History. (July, 1890) The Golden Age of Colonial New York. Burgoyne's Defeat and Surrender. President Lincoln's Humor. Our Relations to the Past a Debt to the Future. (August) The true Story of an Appointment. Major-General Ebenezer Stevens. The French Canadian Peasantry. Pleasure Parties in the Northwest.

The United Service. (July, 1890) History of the Mormon Rebellion of 1856-57. The Battle Tactics of To-day. Captain Morgan's Choice. Frederick the Great. National Guard Camps. The Trials of Staff Officers. (August) The United Cavalry, Past and Present. The Instruction of the Infantry Soldier. Napoleon.—Part I. The Chinese Army. History of the Mormon Rebellion of 1856-57. The Trials of Staff Officers.

Political Science Quarterly. (June, 1890) National Sovereignty. The Comptrollers and the Courts. On Census Methods.

Bulletin of the American Geographical Society. (June, 1890) The Roman Wall in Britain. From Corea to Quelpaert. Volcanic Eruption in the Behring Sea.

The Pacific National Guardsman. (June, 1890) History of California Volunteers during the Civil War. A Russian Officer's Ride to the Exposition. The Three Hundred. A Close Call.

The Pennsylvania Magazine of History and Biography. (July, 1890.) Itinerary of General Washington, from July 15, 1775, to December 23, 1783. The Leaders of the Old Bar of Philadelphia. Autograph Collection of Ferdinand J. Dreer.

Journal of the U. S. Cavalry Association. (June, 1890) The Story of a March. The Riding School and Its Importance in the Training of Cavalry. American Practice and Foreign Theory.

The Railroad and Engineering Journal. (July, 1890) The Latest English Cruiser. The Development of Armor. The Hudson River Tunnel. The Engines of the Maine. United States Naval Progress. Interoceanic Communication by way of the American Isthmus. (August) A Proposed Ship Canal. A French Armored Cruiser. An Indian Engineer's Predicament. United States Naval Progress.

Monthly Weather Review (To date).

Publications of the Department of Agriculture (To date).

Science (To date).

The Army and Navy Register (To date).

Johns Hopkins University Publications (To date).

Philadelphia Weekly Times (To date).

The Boston Courier (To date).

Home and Country (To date).

Kansas City Times (To date).

Somerville Journal (To date).

Table Talk (To date).

The Electrical World (To date).

The Critic (To date).

Announcement.

I.

Prize Essay for 1889.

THE competition for the Gold Medal of the Military Service Institution closes October 1, 1890. Subject of the Essay "A PRACTICAL SCHEME FOR TRAINING THE REGULAR ARMY IN FIELD DUTIES FOR WAR."

II.

Assistant Secretary.

AT a stated meeting of the Executive Council held July 11, 1890, Major WILLIAM L. HASKIN, First Artillery, was unanimously elected Assistant Secretary, Military Service Institution, *vice* Lieutenant BUSH who has relinquished that office.

Historical Sketches
of the
Army
of the
United States.

Extract from the Minutes of a Meeting of the Publication Committee held July 18, 1890.

* * * *

Resolved, That the work of supervising the production, editing and arranging for serial publication of material for the "Historical Sketches of the Army of the U. S." (begun in No. 45 of this JOURNAL) shall be entrusted to a Special Committee of two members of the Institution to be designated by the Chairman of the Publication Committee; said special committee to be governed by the provisions of the Circular of November 10, 1889, to Commanding Officers covering the aggregate number of words for the entire work, and to report progress from time to time.

* * * *

The Chair announces the following "Special Committee on Historical Sketches":

Gen. THEO. F. RODENBOUGH, U. S. Army,
Major WILLIAM L. HASKIN, First Artillery.

* * * *

(Signed)

HENRY L. ABBOT,
Chairman.

[Communications intended for the Committee on Historical Sketches may be addressed: "The Secretary M. S. I., Governor's Island, N. Y. H."]

FOURTH REGIMENT OF ARTILLERY.

By FIRST LIEUT. ALEXANDER B. DYER.

FOURTH ARTILLERY.

In obedience to the resolution of the House of Representatives, May 11, 1820, Mr. Calhoun, then Secretary of War, submitted to the House on the 12th of the following December a plan for the reorganization and reduction of the Army. Since the reorganization of the artillery, in 1814, this arm of the Service had consisted of a regiment of light artillery and the corps of artillery.

The views of Mr. Calhoun, in so far as they related to the artillery, were adopted by Congress; and in accordance with the act of March 2, 1821, the first four regiments now in service were organized from the regiment of light artillery, the corps of artillery, and the ordnance. Each regiment was to consist of one colonel, one lieutenant-colonel, one major, one adjutant, one supernumerary captain to perform ordnance duty, one sergeant-major, one quartermaster-sergeant, and nine companies; and each company was to consist of one captain, two first lieutenants, two second lieutenants, and fifty-five enlisted men. One company was to be equipped as light artillery; and A company was designated as the light company for many years, but continued on foot to the contrary notwithstanding. The general order of May 17, 1821, from the adjutant and inspector-general's office contains the names of the officers of the 4th Artillery, their assignment to companies, and their stations.

John R. Fenwick, lieutenant-colonel of the regiment of light artillery, was made colonel of the "Fourth," with headquarters at Pensacola; and the companies were assigned to the stations on the Florida and Gulf coasts, extending from Saint Augustine to New Orleans. The following table indicates the organizations from which the companies of the regiment were taken:

| <i>Companies and Captains Fourth U. S. Artillery.</i> | <i>Old Organization.</i> | <i>Captains of old Organiza- tions.</i> |
|---|--|---|
| A. (BELL'S) | Co. K, Light Artillery. | BELL. |
| B. (HUMPHREY'S) | Co. C, 3d B., S. D.* | HUMPHREY. |
| C. (BURD'S) | Co. D, 4th B., S. D. (and part of L). | FANNING. |
| D. (PIERCE'S) | Co. G, 3d B., S. D. | ROOT. |
| E. (PAYNE'S) | Co. M, 1st B., S. D. | PAYNE. |
| F.† (HAYDEN'S) | Co. A, 3d B., S. D. | SANDS. |
| G. (HOBART'S) | Co. E, Light Artillery. | HOBART. |
| H. (IRVING'S) | Co. I, 1st B., S. D. (and part of E). | MASON. |
| I. (SANDS) | Co. M, 4th B., S. D. | BIDDLE. |

*B., S. D. in the table stands for "Battalion, Southern Division."

†Organized by Alexander Hamilton in 1776.

It will be seen from this table that the companies were then serving in the South with the exception of A and G; which were sent South from Boston. Some of the lieutenants were afterwards exchanged to other regiments, so that the student of the personnel of the Fourth Artillery will have to consult the War Department order of August 16, 1821.

Under the order of the War Department, dated April 15, 1824, establishing the Artillery Corps of Instruction at Fortress Monroe, Colonel Fenwick was ordered to that post in command of the new school, with Lieutenant-Colonel Eustis of the 4th Artillery as the second in command. Companies C, D and I were selected from the regiment as its quota to the Corps of Instruction.

In April, 1826, regimental headquarters returned to the South, Lieutenant-Colonel Eustis being left in command at Fortress Monroe. Two of the companies of the regiment were changed at the same time. Soon after its organization the regiment suffered severely from the ravages of yellow fever, and the records for several years indicate great mortality. The southern stations were regarded as unhealthy, and in 1827 General Jacob Brown ordered a general transfer of regiments "as the commencement of a system promising to the artillery generally the advantage of a biennial exchange, and the garrisons of the sickly stations in particular (on the southern frontier) the hope of periodical relief."

The headquarters of the regiment were ordered to Fort Columbus, with the companies distributed to stations at Forts McHenry, Delaware, Columbus, Monroe, and at West Point. The total expense for moving all the regiments was \$15,680, an outlay that must have astonished Congress, as the House called for the reasons for such an expenditure. In his letter of reply General Brown says: * * * "It will be only necessary to state the fact that one of our regiments, lately relieved from the Gulf Frontier, has constantly furnished garrisons for the dreary and sickly posts in that quarter since the organization of the Army in 1821. The number of deaths among the officers of that regiment within this period, six years, has amounted to sixteen, being four times greater than the average number in all the other regiments of artillery."

He should have added that the regiment lost two hundred and twenty enlisted men by death during that tour.

During the next few years there were changes of station between companies of the regiment, and at the opening of the year 1829, regimental headquarters were transferred to Philadelphia.

This was the beginning of the practice of separating the headquarters from the companies, and was continued, at times, for many years. The Black Hawk War, in 1832, necessitating the concentration of more troops in the West, in June of that year Brevet-Major Payne (captain of E company) was ordered to proceed to Chicago with E, F and H companies of the regiment; and at the same time five companies from Fortress Monroe were ordered West. This battalion included C and G companies of the regiment, and was under the command of Major Crane, of the 4th Artillery. Lieut.-Colonel Eustis, 4th Artillery, commanding Fortress Monroe, was ordered to the frontier to take command of all the artillery.

These troops formed part of Scott's forces; and instead of arriving in time to fight the Indians, they were, while *en route*, assailed by a more dreadful foe; for on the passage up the lakes the cholera broke out among them.

After terrible sufferings the depleted battalions arrived at Chicago in August, and finally reached Rock River; but too late for active hostilities.

The artillery troops returned to their stations that fall, excepting companies E and H, which remained at Fort Gratiot until May, 1834, when E took station at Fort Trumbull and H at Fort Hamilton.

The political aspect of affairs in South Carolina demanded the attention of the Government, and some troops were sent to that section; companies B, C and G taking station at Fort Moultrie for a few months in 1832-33.

Regimental bands had been merely existing; but in 1832 the regiments of artillery were given "a sergeant to act as master of the band, and one corporal or private in addition to the ten men" allowed to act as musicians.

In the winter of 1833-34, companies A, B and C were part of the forces under Colonel Twiggs, in Alabama. The necessity for troops having passed, they returned to Fortress Monroe in March. Regimental headquarters moved temporarily to Fort Hamilton, but in November, 1835, were established at Fort McHenry. The annual return of the regiment for that year contains the following pertinent remark: "It is the opinion of the colonel that were the regiment concentrated under the command of its own officers, its discipline as well as its instruction might be improved and the number of desertions might be diminished, and a higher spirit of pride and emulation created."

The Seminole War in Florida, began in the fall of 1835, and that winter and spring the Creek Indians, in Georgia and Alabama, also gave trouble; so that in May, 1836, seven companies of the regiment were ordered to Fort Mitchell, Alabama.

Companies B, D, E, F, G, H and I, reached Fort Mitchell in June, and General Fenwick was ordered to command all the troops concentrated there; but being in poor health he soon after returned to Fort McHenry. During that summer the companies were constantly engaged in marching through the swamps on service against the Indians; and when no longer required in the Creek Country, were transferred to Florida. Companies A and C had been sent to Florida the preceding July, so that the entire regiment was concentrated in the Seminole Country that fall.

Company C, under Lieutenant Pickeil, was, August 21, 1836, in the fight at Fort Drane, where it had four men severely wounded. The same company, and part of A, were with Governor Call, October 13, 1836, when he was opposed by the Indians in attempting to cross the Withlachoochee River, and Companies A, C, D, E, F, G and H, were with his second expedition and participated in the battle of Wahoo Swamp, November 21, 1836, where one sergeant of H Company was killed. General Jesup relieved Governor Call and opened his campaign in January, 1837, with Companies B, C, D, E, F, G, H and I, forming part of his command. E Company, under Lieutenant Brent, was engaged at A-ha-pop-ka Lake, January 23d, and

again at Hatchee-Lustee, four days later, as were other companies of Henderson's Brigade, Company I losing one man killed.

Lieutenant-Colonel Fanning and Lieutenant Thomas were engaged in the defense of Fort Mellen, February 8, 1837.

The war seemed over in the spring and the regiment was ordered to New York harbor, excepting D and I Companies, which were to take station at Fort Mifflin. But the flight of the Indians under Osceola, in June, renewed hostilities, and many months elapsed before the regiment left Florida. That summer, B Company was mounted and did duty as light artillery during active operations. A, B, D and H Companies were in Taylor's fight at Lake Okecho-bee, in December, 1837, when the Indians were routed, and B, D and H Companies were in the fight at Locha-hat-chee, January 24, 1838.

Companies D and G were part of Bankhead's forces when he made an expedition into the "Everglades," in March, and fought so successfully the band of Arpieka. Company I under Lieutenant Soley, was engaged at Tuscarilla Pond, April 29, 1838, losing one private killed. At the close of the campaign, the regiment was ordered to the Cherokee Country, western North Carolina, and after assisting in the removal of the Cherokee Indians came north to Fort Columbus, New York. Its period of rest was short, for in September it was ordered back to Florida for service. The act of July 5, 1838, added K Company to the regiment. It was organized at Governor's Island, July 24th, and went to Florida in October. The same act cut off one second lieutenant from each company, but more than compensated therefor by the addition of sixteen privates.

The regiment remained in Florida until April, 1839, and was constantly engaged in scouting and in building roads and forts. The only action we find reported was the successful defense of Fort Maitland, in May, 1839, by a detachment of ten men under the command of Lance Sergeant Thomas Baldwin, a corporal of D Company.

May 27, 1839, the entire regiment was at Fort Columbus, and was sent from there to the Grand Camp of Instruction held at Trenton that summer, at which B Company was mounted as a light battery September 27th, receiving its horses from the Dragoons. On the breaking up of the encampment, the regiment was ordered to the Lake Frontier and the headquarters and seven companies took station at Detroit, A and K at Fort Gratiot, and G, at Cleveland, Ohio. H Company was subsequently sent to Fort Mackinac. During the summer of 1840, Companies C, F and I, under Captain Galt, and a detachment of Light Company B, acting as cavalry, under Lieutenant Soley, were engaged in guarding the emigrants passing through the Indian Country, and collecting the Pottawattomie Indians for emigration. The companies exchanged stations at different times, and in August, 1841, regimental headquarters were removed to Buffalo, N. Y., with companies as far east as Madison Barracks. March 19, 1842, General Fenwick, who had been in bad health for a long time, died at Marseilles, France, and John De B. Walbach, then seventy-eight years of age, became colonel of the regiment. In May, the regiment was ordered from the northern frontier to the seaboard. Headquarters and all the companies, excepting B, arrived at

Fort Columbus in June and July, only to be again transferred, for the order had already been issued for headquarters and six companies to take station at Fortress Monroe, with two companies at Fort Washington, one at Fort McHenry, and one at Fort Severn. Some change in the order must have been made, for eight companies went to Fortress Monroe and none to Fort Washington.

The "light companies" of the Third and Fourth Artillery regiments were to garrison Fort McHenry. The Act of August 23, 1842, reduced the strength of each company by seventeen men, so that in order to keep the light batteries efficient they were reduced to four guns; and under orders 17, of 1844, two companies of each regiment were to be associated together for instruction in light artillery. Light Company B was then at Carlisle, Penn., and Company K was sent there to join it in November, and they remained together until the following September.

Space will not permit us to give more than a brief sketch of what the regiment did in the Mexican War. In the fall of 1845 Lieutenant-Colonel M. M. Payne, 4th Artillery, and companies D, G, E and I, of the regiment, were sent to join the "Army of Occupation" at Corpus Christi. G Company took from Fortress Monroe the matériel for a light battery, and the other companies were armed with flint-lock muskets; but expected to have the new percussion muskets sent to them in Texas. Lieutenant-Colonel Payne was appointed inspector-general of the army of occupation. G Company was relieved of the field guns, and all four companies were assigned to Child's artillery battalion. In the battles of Palo Alto and Resaca de la Palma, May 8th and 9th, 1846, the companies above mentioned did their share of the work, Lieutenant-Colonel Payne being wounded and eight enlisted men killed and wounded. Major Gardner, with F and H companies, joined Taylor's army in July; and in September Light Company B arrived at San Antonio and joined Wool's forces. E company was broken up in July, and A and K companies left Fortress Monroe in October for the seat of war.

During the year, A, D, F, G, H, I and K companies were armed with the percussion musket, "which have so far proved a very efficient weapon, far superior to the flint," says the report of the regimental commander for the year 1846. When Taylor moved from Camargo and from there on Monterey, D, G, H and I companies, with Harvey Brown acting major of the battalion, formed part of Child's battalion of the first brigade, second division, F company having been left at Fort Polk.

Early on the morning of September 21, 1846, the battalion of the 4th Artillery was engaged near Monterey, and at noon of that day G and H companies were selected as part of the command to storm the batteries on Federacion Hill. Early the next morning G and I companies were part of the storming party to carry the works that crowned the Independencia Hill (which was finally accomplished with the bayonet) and afterwards the Bishop's palace. Worth's columns of attack on the morning of the 23d contained the four companies of the 4th Artillery, and they bore off full honors in the fighting that ensued before the capitulation of the city, with a loss of twelve men killed and wounded. First Sergeant Hazzard of I

company was one of the nine soldiers mentioned in the official dispatches as having been highly distinguished. We now turn to Light Company B at the battle of Buena Vista, in February, 1847. It had, besides its four 6-pdr. guns and two 12-pdr. howitzers, two 4-pounder Mexican guns that had been added after its arrival at San Antonio, and its personnel was increased by volunteers from the 1st and 2d Illinois regiments. In this battle, 3 company greatly distinguished itself; Captain Washington, with part of the battery, protecting the right flank of the army, while Lieutenant O'Brien, with the remaining guns, covered himself with glory on the plain. On the 22d O'Brien was so hard pressed that, for lack of horses and cannoneers, he was forced to abandon one of the 4-pounders; and the following day, though wounded himself, and all his cannoneers excepting a few, disabled or killed, this gallant officer fought his guns *à l'outrance*, winning the highest praise from his foe,* who was held in check by those guns, that were "lost without dishonor," until the batteries of Sherman and Bragg came up, and Bragg "saved the day." B battery may well feel proud of its work at Buena Vista, for it is unexcelled. It lost two officers and twenty-four men in killed and wounded.

When General Scott began his campaign that culminated in the capture of the City of Mexico, regimental headquarters, Major J. L. Gardner, commanding, with companies A, D, F, G and H belonged to Twigg's division of his army. Company K was left in garrison at Carmago and I at Fort Polk. The Fourth Artillery participated in the various duties of artillery and infantry in the trenches and on picket at the siege of Vera Cruz. Then moving with Riley's brigade of the division it was engaged at Cerro Gordo April 17th and 18th, 1847, entered Jalapa two days later, and was there joined by E company the following week. In May they all went to Puebla and were there joined by C company. This company left Vera Cruz as light artillery, but was immediately dismounted on reaching Perote, and joined the battalion of the regiment. G company was designated in general orders of July 16th, as the additional light battery of the regiment, but was not mounted until after the battle of Contreras.

In the battle of Contreras, August 19th and 20th, Riley's brigade, with the Fourth Artillery leading, pushed into the village of San Geronimo on the 19th, and when the next morning the storming columns were formed to attack Valencia's troops at Contreras, the column on the right consisted of the Fourth Artillery and part of the Second Infantry, the Fourth Artillery being in front in double column. As the victorious troops were pushing forward, the color sergeant of the regiment (Sergeant Goodwin) was killed, and gallant Lieut. Calvin Benjamin, seizing the colors of the Fourth Artillery, bore them the first into the works. G was the first company to enter, and "recovered with glory" the very guns that O'Brien had fought and lost at Buena Vista.

After the battle the regiment collected around the guns with the greatest feeling of pride and exultation, and received the hearty congratulations of its companions in arms. General Scott, arriving, joined in the cheers, congratulated the regiment on having recaptured the guns that "were lost

* See letter of General Ferres to Don P. Barrasmonda.

by it on the field of Buena Vista without dishonor and recovered with glory," and also promised that, with an appropriate inscription to its honor, they should be given to the regiment in perpetual token of its achievement. Alas! they now rest in the niches of the Administration Building at the Military Academy. "Remember this, and show yourselves men: bring it again to mind, O ye transgressors."

These guns were at once given to Drum, and they formed part of the armament of his company, which was regularly mounted that day. The regiment lost in the battle one officer and thirty-seven men killed and wounded.

At Molino del Rey, September 8th, Battery G did tremendous work. The other companies of the regiment were with the threatening force in front of the south side of the city, and on the morning of September 12th were in the demonstration against the Garita de Candelaria; and on the afternoon of the following day were detached for the purpose of making a diversion on the Piedad Causeway. Battery G was engaged at the storming of Chapultepec, September 12th; and when volunteers were called for that afternoon to storm the heights the Fourth Artillery soon made up its quota (consisting of Lieuts. D. H. Hill and G. A. DeRussy and twenty-seven men from C, E, F and H companies), which formed part of Casey's storming party the following day, while Battery G worked hard at covering the movement by its fire. After that G Battery fought along the Belen Causeway up to the very gate of the city, losing so many men that additional cannoneers were twice furnished by the South Carolina Regiment. Capt. Simon H. Drum, Lieut. Calvin Benjamin and four men killed, and Lieut. FitzJohn Porter and twenty men wounded, attest the hot position of the battery in that fight; and General Quitman truly says in his report: "The losses sustained by Captain Drum's heroic little band of artillerists from the Fourth Artillery evince their exposure during the day. I do them, officers and men, but justice when I add that no encomium upon their conduct and skill would be misplaced."

The storming party of the regiment at Chapultepec had not gotten off without loss, six men having been wounded. The following day the regiment entered the city. On the very night the gates of the City of Mexico were opened the siege of Puebla (where we left A Company) began, and continued for thirty-two days, A Company being actively engaged at various times during the siege.

The Act of February 11, 1847, gave the regiment another major and a regimental quartermaster; while that of March 3d added L and M Companies. M Company was organized at Fortress Monroe, July 28th, and L Company at Fort Columbus, N. Y. H., November 12, 1847. Both of these companies joined the regiment in Mexico the following December.

In the war with Mexico the regiment lost two officers killed and four wounded, and one hundred and twenty-four enlisted men killed and wounded.

When the regiment left Mexico for Fortress Monroe, in the summer of 1848, Light Battery B and Company K were ordered to remain on the line of the Rio Grande. G Company turned in its horses at New Orleans, but

took its guns to Fortress Monroe, where it was regularly dismounted in accordance with the Circular of September 30, 1848, A. G. O. Under the Act of July 14, 1848, the companies were reduced to forty-two enlisted men. In October the regiment was ordered to Florida, and headquarters were established at Fort Pickens, but moved to Pensacola in the following spring.

General Orders 22 of 1849 mounted an additional battery in each regiment. G, of the Fourth, having been designated for that duty, was sent from Fort Pickens to Jefferson Barracks; and after being there mounted proceeded to Leavenworth and engaged in field duty. It did not remain mounted very long, for in March, 1851, all the light batteries were dismounted excepting Taylor's of the First, and Bragg's of the Third Artillery. While in Florida the companies were kept constantly at work moving through the country. The orders of October 8, 1850, sent the regiment North with headquarters at Fort Columbus, the companies being distributed to that post and Forts Lafayette, Hamilton, Mifflin and Washington. A, C, H and M Companies did not remain long at their new stations, for in June, 1851, they were sent to the coasts of North and South Carolina, only to be sent North again the following June, when headquarters were ordered to Fort Hamilton and a number of the companies to stations on the Lakes, as far as Fort Mackinac.

In 1853 some of the companies again changed station, C and I Companies going to Fort Independence, Massachusetts, while D and M, less fortunate, were sent to the Rio Grande. General Walbach established regimental headquarters at Baltimore, October 1, 1853, the regimental quartermaster and band remaining at Fort Hamilton. In May, 1855, G Battery was ordered to prepare for the field as a mountain-howitzer battery, and was so exercised on two occasions; but after firing a few rounds of ammunition at practice, the matériel was so much injured by the cracking of axles, etc., that the scheme had to be abandoned. The battery subsequently joined in the Sioux expedition, mounted on the battery horses and armed with long range rifles, and September 3, 1855, was engaged under Captain Howe in the battle of Blue Water against the Brûlé Indians, being the only one of the four mounted companies that attacked the enemy on the heights on foot, losing two men in the fight but killing and capturing a number of the Indians. October 10th, it encountered a band of Indians and captured five, and subsequently took station at Fort Laramie.

The first part of the following year it operated as cavalry under Cooke, but in August it proceeded to Fort Leavenworth, resumed its guns and participated in the Kansas troubles. It was dismounted under G. O. 9 of 1856, which permitted only one battery to each regiment, and was sent to Fortress Monroe in December to form part of the artillery school.

In the fall of 1856, the regiment was again sent to Florida, the field and staff arriving at Fort Brooke, December 13th. All the companies, excepting B and G were that winter in Florida, having been drawn from Fort Mackinac on the north and Fort Brown on the south, "in order to carry on a vigorous campaign against the Seminoles, who have within the year given evidences of their hostility."

Light Battery B had already been sent from Texas to Jefferson Bar-

racks, and in March, 1857 joined at Fort Leavenworth to form part of Harvey's Utah expedition. It there received the horses of G Company, recently dismounted, its own having been turned in at New Orleans.

The regiment was very actively engaged in hunting Indians while in Florida, and suffered great hardships in some of its expeditions through the swamps. The only casualty reported was the wounding of Pvt. King of M Company, in an engagement at Big Cypress, March 13, 1857.

General Walbach died June 10, 1857, at the advanced age of ninety-three years, and Francis S. Belton was made colonel of the regiment. The operations in Florida were prosecuted with good promise of a successful termination of the campaign, but the War Department concluding that its services were needed in Kansas, all the regiment was sent to that Territory in the fall of the year 1857, and soon after distributed through Utah and Nebraska. The field staff and band and Companies A and I took station at Fort Laramie, in August, 1858; Company C and Light Battery B went to Salt Lake, D and E to Platte Ridge, F, H and K to Fort Kearney, and L and M to Cheyenne Pass.

The following summer headquarters and companies E, H, I, L and M were sent to Fort Randall, Dakota, A, to Salt Lake, and F and K to Fort Ridgely, Minn. The privates of D Company were transferred to other companies of the regiment, and the officers and non-commissioned officers proceeded to Fortress Monroe, where the company was reorganized and took station. During the trouble at Harper's Ferry, in the fall of 1859, G and part of D Company were sent to that place and remained there several weeks in November. In 1860, the companies in Utah were kept busy protecting the parties of emigrants going West, and keeping open the mail routes. Light Battery B, operating as cavalry, marched during that summer 2000 miles over a barren and desert country, and though the Indians were continually hostile, the roads were kept open. The battery had a successful fight against 200 Indians at Eagan's Canyon, August, 11, 1860, losing three men wounded (one mortally). August 10th, Sergeant Bishop, commanding a small detachment of the battery, was attacked and forced to withdraw to Deep Creek, where in a fight with a party of Indians, September 6th, he was wounded. All the companies on the plains were kept busy scouting that summer. L Company was sent from Fort Randall to Fortress Monroe that year, exchanging with Company G.

In the War of the Rebellion the active service of the batteries (the term by which we shall hereafter designate the units of the regiment) was so continuous and they were so separated that it is simply impossible, in a short magazine article, to attempt more than a general indication of the work performed by them. The outbreak of the War soon brought the regiment in from the plains. Regimental headquarters took station at Fort McHenry, but were subsequently sent to Fort Washington. Colonel Belton was retired August 28, 1861, and Charles S. Merchant became colonel of the regiment. He was retired August 1, 1863, and Horace Brooks was made colonel.

We will now give, in alphabetical order, the services of the batteries during the War.

BATTERY A.—Batteries A and C were united at Washington, D. C., in October, 1861, made a light battery (4 10-pdr. Parrots) and attached to Sumner's Division in December. In March, 1862, its armament was changed to 6 12-pdr. guns, and it was assigned to Richardson's Division of the Second Corps.

It was first engaged with the enemy at Rappahannock Station April 28, 1862, being with Howard's Brigade; and in the ensuing campaign against Richmond it did its full share of hard work. It fought well at Fair Oaks June 1st; and, forming part of the rear guard of the Army, was heavily engaged at Allen's Farm and Savage Station June 29th, and at White Oak Swamp June 30th (Capt. G. W. Hazzard of C being mortally, and Lieut. A. Morris slightly wounded), and was in reserve at Malvern Hill the following day.

With Sumner on the right flank of the Army at Antietam it fought desperately, and in the language of its corps commander, rendered "distinguished service." It was next engaged at Charlestown, W. Va., October 16, 1862. Two days later the batteries (A-C) were separated at Harper's Ferry.

A Battery obtained seventy men from the 4th Ohio, proceeded to Washington to refit, obtained 6 3-in. rifles, and rejoined the Second Corps.

It was near the right of Hays' Division of Artillery when Fredericksburg was bombarded, and afterwards crossed the river and was in the fight of December 14th. It afterwards formed part of the artillery reserve of the Second Corps; and though present and occupying several positions at Chancellorsville, it was not regularly engaged. After that it became part of the artillery brigade of the Second Corps, and was engaged with the enemy at Haymarket May 28, 1863.

On the afternoon of July 2, 1863, it was put in position just on the right of Webb's Brigade of the Second Division, and fought hard and well; and when, the following afternoon, this point became the objective of the opposing forces, and Pickett's men pushed forward to the stone wall, Battery A of the Fourth Artillery, just in rear of the wall, though hard hit itself, poured withering fire into the advancing ranks. The battery may well be proud of its magnificent record in the battle of Gettysburg, and Lieut. Alonzo H. Cushing, killed in Pickett's charge, has left a name for gallantry that cannot be excelled.

Cushing and Milne (1st R. I. A. attached) killed, Canby wounded, thirty-eight men killed and wounded, three limbers blown up, carriages and guns broken and injured, and sixty-five horses killed and wounded bear witness to the fact that A Battery was engaged at Gettysburg. What remained of it was attached after the battle to I Battery of the 1st Artillery, but was separated from it July 16th, made a horse battery (2 3-in. rifles and 2 12-pdr. Napoleons), assigned to the First Brigade of Horse Artillery, and remained with it until dismounted in June, 1864.

Its service while a horse battery was with the cavalry, and it fought at Sulphur Springs September 11th and 12th, at Bristoe Station October 14th, and at Parker's Store November 29, 1863.

In Grant's Wilderness campaign, in the spring of 1864, it was engaged

at Todd's Tavern May 5th, at Tiney Woods May 6th, again at Todd's Tavern May 7th, and at Pine Run May 8th.

Starting on Sheridan's raid May 9th, it fought at Ground Squirrel Church May 10th, before Richmond May 11th, at Mechanicsville May 12th, and at Salem Church and Harrison's Store May 28th. It reached Harrison's Landing June 3d, and was there dismounted. It was sent the next day to Washington, equipped as a light battery, and remained in the defenses of Washington from that time until the close of the War.

BATTERY B.—B Battery was a light battery throughout the War. It was armed with six 12-pdrs. until May, 1864, when two of the guns were turned in, and it thereafter served as a four-gun battery. It reached Washington in October, 1861, obtained its new armament, and was assigned to M'Dowell's Division the following month. When Pope's army was organized in June, 1862, it was assigned to the 4th (Gibbon's) Brigade of the 1st (King's) Division of the 3d (M'Dowell's) Corps.

It was first opposed to the enemy at Orange Court House July 26, 1862, was under fire at Cedar Mountain August 17th-19th, engaged in the defense of the Rappahannock at Rappahannock Station August 21st-23d, in action at Sulphur Springs August 25th-26th, fought hard at Gainesville August 28th, and at the second battle of Bull Run August 29th-30th.

When McClellan resumed command of the Army King's Division was assigned to the 1st (Hooker's) Corps. The battery, still with Gibbon, fought gallantly at South Mountain September 14th, and in the battle of Antietam September 17th, when Hooker was directed to turn the left flank of the enemy, B Battery was in the thickest of the fight, and though subjected to a murderous fire at short range dealt desperate and effective blows in return. Lieut. J. B. Campbell wounded, thirty-nine men and thirty-three horses killed and wounded are indicative of the position of the battery in that battle. At Fredericksburg, with Doubleday's Division of the 1st Corps, it crossed the river and was engaged in the battle from the 13th to the 15th of December, 1862, and won the highest encomiums from its corps commander, John F. Reynolds. After the battle it became part of the artillery brigade of its division. It was engaged at Fitzhugh's Crossing April 26, 1863, and was next under fire at Chancellorsville May 4th, 5th and 6th.

After that the artillery of the corps was consolidated and it became part of the artillery brigade of the 1st Corps. It went into action at Gettysburg on the afternoon of July 1st, and was severely engaged, barely escaping capture, and finally fell back to Cemetery Hill. The next day it was hard at work under a very heavy fire, and continuing in position, had the same experience July 3d. Lieuts. James Stewart and James Davison (5th Art. attached) wounded, and thirty-two men and thirty-two horses killed, wounded and missing, one caisson blown up, three broken down, and two guns placed *hors de combat* are indicative of the positions occupied by "Jock" Stewart's Battery on the field of Gettysburg. The battery was engaged at Funkstown July 11th, at Warrenton July 23d; and at Haymarket October 19th, and Mine Run Nov. 30th it was in position.

It fought in the Wilderness in May, 1864, being engaged at Spottsylvania

vania Court House May 12th, Po River May 20th, North Anna May 23d, and Tolopotomy Creek May 25th. It was in position June 1-4th at Bethesda Church, losing heavily in the fighting on the third and fourth days. In position at White House June 15th, and engaged all day in the fighting before Petersburg on June 18th, and remained in that vicinity the rest of the year. It was engaged in a fight at Hatchers Run October 28, 1864, fought well at Gravelly Run March 29, 1865, where Lieut. John Mitchell was wounded, and ended its fighting in the Civil War at Quaker Road March 30, 1865. Its war record is magnificent, excelled by none, and only equalled by that of Battery K.

BATTERY C.—C Battery had to its record, when separated from Battery A in October, 1862, the various engagements indicated in the record given above of Battery A. Its captain, G. W. Hazzard, was mortally wounded at White Oak Swamp. When A and C batteries were separated, the horses, guns and equipments were turned over to C Battery, which remained with Hancock's division of the Second Corps. It crossed the river with the Irish Brigade December 12, 1862, was placed in position opposite Marye's Heights the following day, and during the battle of Fredericksburg, when the infantry struggled so hard to carry the Heights, C Battery did all that it could to assist its sister arm. It next fought at Chancellorsville May 2-3, 1863, where part of the battery was with Hancock and Geary, and when the Third Corps was forced back on Sunday morning the half of C Battery at the Salient Angle, subjected to a terrific fire, poured canister into the enemy not sixty yards distant. The struggle was desperate, Lieutenant O'Donohoe (attached) was killed, and the intrepid Field voluntarily remained with Geary and did good work long after he had been ordered out of action.

The battery was afterwards assigned to Ransom's (First Regular) Brigade of the Reserve Artillery. It was sent forward July 2d to the line of battle at Gettysburg, just to the left of the Second Corps, and on that and the following day was well fought by Evan Thomas, losing Lieut. John M'Gilvray wounded, and seventeen men and twenty-nine horses killed and wounded. In August it was reduced to a four-gun battery (12-pdr. Napoleons), and during October operated with the Third Division of the Sixth Corps. It was regularly assigned to that corps October 16th, and fought at Mine Run November 30, 1863.

It was united with E Battery as a horse battery April 11, 1864 (2 3-in., 2 12-pdrs.) and they remained so united until after the close of the War.

This united battery was at once assigned to the first brigade of horse artillery, and during the spring campaign of 1864 was attached to the third division (Wilson's) of the cavalry corps, and was engaged at Craig's Chapel and Todd's Tavern May 5th; at Spottsylvania Court House May 8th; and, participating in Sheridan's raid, fought at Meadow Bridge May 12th, and at Mechanicsville, May 14th, losing five men and twenty-two horses. Continuing with the cavalry corps it was engaged at White Oak Swamp June 3d, also at Riddell's House the same day. Starting on Wilson's raid June 22d, it fought at Nottoway Court House June 23d, Roanoke Station June 25th, Stoney Creek Station June 28th, and June 29th at Ream's Station, where

Wilson ran into the Confederate infantry, and after some severe fighting the battery was captured. The guns were spiked, the carriages destroyed, and the men mounted on the battery horses with pistols and sabres picked up on the road, fought their way out, and rejoined the horse artillery brigade the following day, after having lost several men wounded and eighteen captured. It was at once re-equipped as a horse battery, receiving the same armament as before.

It went with Wilson's cavalry division to operate under Sheridan in the Shenandoah, and was engaged at Winchester August 17th; Summit Point August 21st; Kernsville August 25th; Berryville September 5th; after which it joined the reserve at Pleasant Valley. October 25th, with a brigade of the 19th Corps, it was successful in repulsing the attempt of Mosby to capture the paymaster's train at Bunker Hill, and joining Sheridan the following day was assigned to the second brigade of the first cavalry division.

The half battery of rifled guns formed part of Sheridan's command; when he made his raid that began February 27, 1865, and this part of the battery did good work in the fights that occurred at Waynesboro March 2d; Dinwiddie Court House March 31st; Five Forks April 1st; Scott's Cross Roads, Sutherland Station, and Brown's Cross Roads April 2d; Nelson's Farm and Sailor's Creek April 6th; Appomattox April 8th; and on the following day formed part of the fighting line that barred Lee's way and forced the surrender of the Army of Northern Virginia.

BATTERY D.—D Battery was mounted as a light battery in February, 1862, (6 12-pdr. guns) and remained a light battery throughout the War. A detachment of it was at Big Bethel June 10th, and at Fort Hatteras August 28, 1861.

The battery formed part of Wool's force for the capture of Norfolk in May, 1862, and the following September was sent to Suffolk, where it remained with the troops under General Peck, forming part of the first division of the 7th Corps; and was sent on various expeditions while serving in that vicinity. The right section (platoon is the name now given to what was then designated a section), under Lieutenant Whitney, was engaged at Franklin, Va., October 4th, and the entire battery having marched 50 miles in 30 hours, was in action at the same place October 31st. It was next engaged when General Corcoran had his fight at Deserted House January 29, 1863 and again the same afternoon, ten miles from Suffolk, losing in the latter fight eleven men killed and wounded. April 24th the left section was in action at Edenton Road under General Peck, and from April 10th to May 30th, the battery was engaged in the siege of Suffolk. It was also in action May 24th while engaged under General Corcoran in destroying the Petersburg R. R.

It fought at Franklin, Va., June 18th, and at Windsor June 22d, being part of the first division of the 7th Corps. When the 18th Corps was organized in April, 1864, to play its part in Grant's campaign against Richmond, the battery belonged to the artillery brigade of the Second (Weitzel's) Division, and moved to Bermuda Hundred in May. The right and left sections were, with the first division of the 18th Corps, engaged against the enemy at Point of Rocks May 7th, and the right section had several men wounded

in the fight near Petersburg May 9th. The centre and left sections were heavily engaged with severe loss at Fort Darling May 14th, the entire battery at the same place two days later, and in front of Petersburg June 15th, 16th and 17th. The left and centre sections were engaged at Deep Bottom July 26th. The battery forming part of the artillery brigade of the 10th Corps participated in the siege of Petersburg, being daily engaged from August 26th to September 24th, 1864, and also fought at Laurel Hill September 29th, and at New Market Road October 7th of that year. It remained in front of Petersburg until December, when it is reported as in front of Richmond, where it remained until April 3d, when it marched through the city that had been so long the capital of the Confederacy.

BATTERY E.—Battery E, armed with 6 10-pdr. Parrott's, was mounted as a light battery at Camp Monroe, Ohio, in August, 1861, and joined Rosecrans' army in West Virginia. In December it was sent to General Kelly at Romney, and a section was with Dunning in his little fight near Blue Gap, January 7, 1862. The battery now belonged to Landers' Division, which afterwards became the second (Shields') division of the 5th (Banks') Corps in the organization of March, 1862. Four guns of the battery were in the skirmishes at Middletown and Cedar Creek March 18th, and the entire battery, with Kimball's Brigade, fought at the battle of Winchester March 23d, and was in the skirmish at Mount Jackson April 17, 1862.

May 1st, Shields' Division was transferred to M'Dowell's department. One section of the battery was engaged at Front Royal May 31st, and June 9th the entire battery was heavily engaged at Port Republic where, after a desperate resistance, it lost three guns and two caissons. One of the guns it had the satisfaction of recapturing during the battle. The lost guns were not replaced; but in July the battery was made a horse battery, retaining its four Parrott guns. When the 1st, 2d and 3d Corps were organized in June, 1862, the battery remained with M'Dowell, being reported as unattached; but in August it was assigned to Reno's Division of the 9th Corps, and was engaged in the defense of the Rappahannock August 15-26th.

Temporarily attached to Hooker's Division it was engaged at Broad Run August 27th. Then rejoining Reno it fought at the battle of Second Bull Run August 29th and 30th, where it "behaved nobly," and was in action at Chantilly September 1st. In the reorganization of the Army it became part of Sturgis' (2d) Division of the 9th Corps, and did good fighting at South Mountain September 14th. It participated in the battle of Antietam September 17th, where Lieut. E. L. Baker was killed, and Capt. J. C. Clark was four times wounded. The battery being without officers, General Hunt selected Lieut. Geo. W. Dickenson, 4th Artillery, to reorganize the battery after the battle and prepare it for field service. Temporarily with Hancock's Division, it was in the fight at Charlestown, W. Va., October 16, 1862. It formed part of the grand battery opposite Fredericksburg, then crossed the river with its division (Sturgis') on the morning of December 12th, and was heavily engaged on the following day, when it was subjected to a terrific fire. In less than twenty minutes "the gallant Dickenson fell gloriously at his post," while twelve of the gunners were killed and wounded, and all the men were twice driven from their guns.

In March, 1863, it was assigned to the first brigade of horse artillery. After Fredericksburg "Sam" Elder was placed in command of the battery and retained it until the following November when he joined his own regiment. It fought at Kelly's Ford April 14, 1863, while on Stoneman's Raid, and after returning from the raid the Parrott guns were turned in and replaced by four 3-inch rifles. The battery was next engaged at Beverly Ford June 14th, with Buford, and next with Kilpatrick's division at Hanover June 30th; in the Battle of Gettysburg July 1st, 2d and 3d; at Smithsburg July 5th; at Hagerstown July 6th; at Boonsboro July 8th; at Funkstown July 10th; again at Hagerstown July 11th; at Port Conway September 3d; at Brandy Station October 10th and 11th; at Buckland Mills October 13th; fought again the next day, and again near Buckland's Mills October 19th. October 27th and 28th it was in action while engaged in guarding Raccoon Ford, and in December went into winter quarters with its brigade of horse artillery. A new armament of 3-inch guns was obtained in March, 1864, but on the 11th of April C and E batteries were consolidated and made a horse battery (two 3-inch rifles and two 12-pounder guns) and the war record of E battery from that time on has already been given in the record of Battery C.

BATTERY F.—Battery F arrived in Washington from the West on the 18th of April, 1861, after having had a number of its men injured from stones, etc., thrown by the mob while passing through Baltimore. It was sent to Carlisle in June and there equipped as a light battery (four 6-pounder guns and two 12-pounder howitzers) and formed part of Patterson's command, the sections being distributed to the different brigades. The battery was first engaged at Falling Waters July 2d, 1861; July 8th it is reported as attached to Stone's brigade.

In the organization of the Army, October 15, 1861, it was assigned to Banks' division, of which it then formed part, and was engaged for several days in December in defending dams Nos. 4 and 5. In the reorganization of March, 1862, it was assigned to the First (Williams') Division of the Fifth (Banks') Corps. One section was in action at Newton May 24th, and the entire battery fought in the battle of Winchester the following day. In June, 1862, the armament was changed to six 12-pounder Napoleon guns. When Pope's army was formed Banks' corps became the Second Corps. At Cedar Mountain the battery fought hard and well, suffering severely and losing, by an accident, one gun in the retreat. After Pope's campaign Banks' corps was made the 12th Corps (General Mansfield's) which, after Antietam, became Slocum's. The battery was, in the reorganization, taken from the division, to form part of the artillery brigade of the corps, and was held in reserve at Antietam and not engaged during the battle.

It was at Chancellorsville that it covered itself with glory, being engaged May 1st, 2d and 3d. Lieut. E. D. Muhlenberg, with his guns at the angle near Geary, did work of which the battery may well feel proud, for with "courage, coolness and indomitable bravery—he contended against the fearful odds before him until every gunner was killed or wounded at his post, seven horses killed and his ammunition exhausted." Lieutenant F. B.

Crosby, a most gallant and efficient officer of the battery, was killed on the 3d.

We next find the battery engaged at Gettysburg, when July 2d it was in action near Culp's Hill, and on the following day, placed about the centre of the line of the 12th Corps, it rendered valuable service by its work against the enemy. That ended the fighting of F Battery for the War. It went West with the 12th Corps that fall, and in the spring of 1864 was sent to Nashville to form part of the first division of the reserve artillery of the Army of the Cumberland. In October, 1864, it was dismounted, the privates assigned to M Battery, and the officers and non-commissioned officers sent east to recruit. It was not remounted nor did it again rejoin the forces in the field.

BATTERY G.—Early in June, 1861, Battery G was equipped as a light battery (4 6-pdr. guns and 2 12-pdr. howitzers) at Cincinnati, and joined McClellan in West Virginia, being present at the fight at Rich Mountain July 11th. On the 25th of July it was assigned to the Third (McCook's) Brigade by Rosecrans, and subsequently joining the First (Reynolds') Brigade, it fought well at Green Briar River October 3d, losing six men killed and wounded. In December it joined the Army of the Potomac as part of the reserve artillery, and received a new armament of 6 12-pdr. Napoleon guns.

It participated in the Peninsular campaign, being actively engaged in the siege of Yorktown. After that it was attached to the Second (Slocum's) Division of the Second (Franklin's) Corps, and a month later joined Getty's Brigade of Reserve Artillery. June 28, 1862, it joined Naglee (of Peck's Division of the Fourth Corps), who was left behind to hold Jackson in check, and was that afternoon engaged in the fight at Bottom's Bridge. It was on the line of battle and slightly engaged on several occasions during the retreat, serving with Peck, and also Smith's Division of the Sixth Corps, after which it returned to the artillery reserve. It next appeared with Sykes' Division at Antietam, and while the battle was going on was sent to Burnside; but it practically did nothing in that battle.

At Fredericksburg it belonged to the right centre division of the reserve artillery, was placed just to the left of the Lacy House December 10th, and the next day was engaged and did well in covering the crossing of the troops. It was next in action near Falmouth May 3-4, 1863, and the month after was assigned to the Artillery Brigade of the Eleventh Corps. July 1st, with the First (Barlow's) Division of its Corps, it was severely engaged at Gettysburg, losing its commander, Lieut. Bayard Wilkeson, "an officer of great gallantry." That night it was placed in position on Cemetery Hill, where, under Lieut. E. A. Bancroft, it did heavy fighting July 2d and 3d, losing thirteen men and twenty-four horses killed and wounded. It participated in the movements of the Army of the Potomac until that fall, when it was sent West with its corps; fought at Chattanooga October 22d, 23d and 24th, and engaged in the pursuit of the enemy on the 26th and 27th. The matériel of the battery was turned over in February, 1864, to the First Ohio, the officers and men of the battery being sent to Nashville, where in April four guns (4 12-pdr. Napoleons) were given to it, and in June

a full complement of horses was obtained. The battery was dismounted in the following October, the privates transferred to Battery I, and the officers and non-commissioned officers sent to New York to recruit. Its field service in the War of the Rebellion was over, but in February, 1865, it was remounted as a light battery at Washington, D. C.

BATTERY H.—H and M Batteries arrived at Louisville, Ky., in January, 1862, from the West. February 1st they were united, mounted as a light battery (2 3-in. and 2 12-pdrs.), and assigned to Crittenden's Division, that formed part of Buell's command.

At the battle of Shiloh, April 7th, this battery went into action near the left of Nelson's line and did magnificent work, and later in the day, with the 14th Brigade, it added lustre to its record. In the reorganization in May, 1862, it was assigned to Nelson's Division and was engaged in the siege of Corinth; and while in the trenches at that place received two more guns (3-in. rifles). It moved out of the trenches with the 22^d Brigade on the 28th of May and seized the bridge at Bridge Creek, where it had a heavy fight.

One section was with Jackson's Cavalry, when he had his fight at Tuscumbia Creek, May 31st. June 2^d the armament was again increased by the addition of 2 12-pdr. howitzers. The battery was at the battle of Perryville, October 8th, but not engaged. When Rosecrans assumed command in October, 1862, it was attached to the Third (Grose's) Brigade of the First (Smith's) Division of Crittenden's Corps, and at the battle of Stone River, December 29 and 31, 1862, and January 2, 1863, it was heavily engaged. A few days after that battle the batteries were separated, H retaining the four 12-pdr. howitzers and M the 3-in. rifles. H Battery remained with Grose's Brigade and fought at Chickamauga, September 19th and 20th, where Lieutenant Robert Floyd (3d Art. attached) was mortally wounded, twenty men and twenty-five horses killed and wounded, and one gun lost. In this battle the battery, under Lieutenant H. C. Cushing, did magnificent fighting and fully earned the high praise bestowed on it.

February 24 and 25, 1864, it was engaged against the enemy at Buzzard's Roost Gap. The following month it was relieved from duty with Grose's Brigade, sent to Nashville to form part of the reserve artillery, and was there dismounted in October, 1864, the privates being transferred to Battery I, and the officers and non-commissioned officers sent east to recruit. It was then sent to Washington where it was remounted as a light battery, in March, 1865, but its war service was over.

BATTERY I.—In June, 1861, Battery I joined McClellan's headquarters in West Virginia, and was present at Rich Mountain, July 11th–12th. July 22^d, it was mounted as a light battery (4 mountain howitzers) and three days later was assigned by Rosecrans to the Second Brigade. That fall, with different brigades, it was engaged in several minor actions, viz.: Carnifex Ferry September 13th; New River November 5th; again at New River November 11th, and the following day used two 10-pdr. Parrott's (recently added to its armament) at the same place. Leaving its howitzers in West Virginia, the battery joined Buell's forces in Kentucky in December, there received 4 6-pdrs. (two of which belonged to the 4th Michigan) and was as-

signed to Thomas' Division, which subsequently became T. W. Sherman's. The battery was engaged in the siege of Corinth, in May, 1862, and joined in the pursuit of the enemy after the evacuation of the town. In August it was regularly assigned to the Third (Steedman's) Brigade of the Third (Thomas') Division, which was then under command of General Schoeppel, and participated in the manoeuvres against Bragg. After that the section of the 4th Michigan was relieved and the armament of the battery became 2 6-pdr. guns and 2 10-pdr. Parrott's.

The Third Division passed into Gilbert's Corps, and was engaged near Springfield, October 4th, and at Perryville, October 8, 1862. When Rosecrans took command and reorganized the army the battery became part of the Third (Steedman's) Brigade of the First (S. S. Fry's) Division of the Fourteenth (Rosecrans') Corps, October 24, 1862. In February, 1863, its armament was changed to 4 12-pdr. guns. It skirmished with the Confederate Cavalry near Chapel Hill March 3d, and near Harpeth River March 8th, and was sent several times during that month to the Harpeth River to prevent the enemy from crossing. It participated in the Tullahoma campaign, and on the morning of September 19, 1863, opened fire at Chickamauga, where it was heavily engaged on that and the following day, losing Lieutenant N. Redmond wounded, twenty-three men and nineteen horses killed and wounded, one limber blown up and the battery wagon captured. This was the heaviest and most brilliant work of the battery in the War, and the clear judgment of Lieutenant F. G. Smith, in holding it at Snodgrass Hill, after Negley's withdrawal, which subsequently became the key point for the artillery that turned the tide of battle, enhances the value of the work well done.

While at Chattanooga the battery, with the other troops, suffered for lack of supplies and most of the horses died of starvation while standing at the picket line; so that when it moved out in November it had only some thirty nearly starved horses and a few mules to draw the guns and caissons.

At the battle of Chattanooga, November 23, 1863, it was put on duty with the Second (Sheridan's) Division of the Fourth Corps and was engaged near Bushy Knob on that and the following day. It joined, with its own division, in the pursuit on the 26th, but the horses were in such poor condition that it had to be sent back to Chattanooga, where it was dismounted in March, 1864, and sent to Nashville to form part of the garrison artillery. In October it was filled up by the transfer of the privates from G and H Batteries, obtained the four 12-pdr. guns from H Battery, and was regularly mounted as a horse battery. It was assigned to Johnson's Division of Cavalry, and in the following month to Wilson's command of Cavalry. It was engaged against the enemy at Charlotte's Pike December 15, 1864, and at Pulaski ten days later, where, owing to the loss of seventeen horses and lack of support, one gun was lost.

When Wilson prepared for his raid through Alabama in the spring of 1865, the battery under Lieut. G. B. Rodney, with eight horses to each of its four 12-pdr. Napoleons, formed part of Upton's Division. It skirmished with the enemy at Jasper March 26th, fought near Montevallo March 31st,

was present at Ebenezer Church April 1st, engaged at Selma April 2d; and April 16th did its last fighting in the War at Columbia.

BATTERY K.—In August, 1861, Battery K was sent to Washington, mounted as a light battery (2 20-pdr. Parrott's and 2 12-pdr. howitzers), and in the organization in October was assigned to the Reserve Artillery. In December its armament was changed to 6 12-pdr. Napoleon guns. It remained a light battery throughout the War, retaining its six guns until May, 1864, when two of them were turned in, under the order reducing the batteries to four guns each.

It participated in the Peninsular campaign, being engaged at Yorktown April 28, 1862. June 2d it was assigned to the Third (Heintzelman's) Corps, and fought at Fair Oaks June 25th, at Ropers' Church June 30th, at Malvern Hill July 1st, and again at the same place August 6th. It did not reach Second Bull Run in time to participate in the battle, but was engaged at Chantilly September 1st.

When Burnside took command of the Army it was assigned to the Second (Sickles') Division of the Third (Hooker's) Corps, having been previously part of the reserve artillery of the corps. It was engaged in the bombardment of Fredericksburg December 11th and 12th, forming part of Tompkins' Division of Artillery; then joining Franklin's troops on the following day, it did excellent service against the right flank of the enemy.

May 3d it fought at Chancellorsville, losing Lieut. I. Arnold (Ord. Dept. attached), wounded, and 44 men and 59 horses killed and wounded. It was in this battle, on the height at Fairview, at the extreme left of the crest, while under the most terrific fire, that K Battery won the admiration of all who beheld it, and its record at Chancellorsville under Lieut. F. W. Seeley, that prince of battery commanders, must always form one of the brightest pages in the history of our light artillery. Its work may be equalled but it cannot be surpassed.

After the battle it became part of the corps artillery, was assigned to Humphreys' Division of the 3d Corps for the battle of Gettysburg, and July 2d and 3d did work that, in the language of that magnificent soldier, Humphreys, "excited my admiration as well as that of every officer who beheld it." Lieutenant Seeley was severely wounded and 24 men and 28 horses were killed, wounded and missing. The Battery was next engaged at Union Mills October 18th, and at Mine Run November 30, 1863. In April, 1864, when several of the Army corps were consolidated, the Battery was assigned to the artillery brigade of the 2d Corps, and during the succeeding campaigns of the War, under command of Lieut. J. W. Roder, its hard fighting added to the magnificent reputation it had already acquired. In the Wilderness campaign it was engaged at Spottsylvania Heights May 10th, 12th, 16th and 18th; near North Anna May 23d, 24th, 25th and 26th; at Sheridan's Farm May 30th and 31st; at Cold Harbor June 3d, 4th, 5th and 12th; near Petersburg June 16th, 17th, 19th, 20th and 26th; at Deep Bottom August 16th, and Boydton Plank Road October 27, 1864.

The right section was engaged at Hatcher's Run, February 7, 8, 1865, and the Battery participating with its corps in the final campaign against Lee, was in action near Hatcher's Run March 22d, in the vicinity of Fort

Cummings March 25th, at Hatcher's Run April 1st and 2d, at Sailor's Creek April 6th, and had the satisfaction of being at Appomattox Court House on the 9th of April when the Army of Northern Virginia laid down its arms.

BATTERY L.—Battery L was mounted as a light battery at Fortress Monroe, in July, 1861 (6 12-pdr. Napoleons), and remained so mounted throughout the War. Its first engagement was March 8, 1862, when, from its position at Newport News, it was in action against the famous *Merrimac*.

It was sent to Suffolk in July to form part of General Mansfield's force, and remained in that vicinity until the organization of the Army of the James, when it joined that army and participated in its operations. When the 7th Corps was formed, in September, 1862, the Battery became part of Peck's Division of that Corps. It was attached to Ferry's Brigade in the operations that fall, and fought at Blackwater October 26th, and at Joiner's Ford December 13th of that year.

Getty's Division of the 9th Corps became the 2d Division of the 7th Corps in March, 1863, and the battery was attached to it. It participated in the siege of Suffolk, which lasted from April 10th until May 3d, and also fought near Suffolk May 3d; near Franklin May 16th, and was again in action a few days later, when it assisted in the destruction of the Petersburg railroad. In July, 1863, it was sent with Spear's Brigade of Cavalry on a raid into North Carolina, and was engaged against the enemy's entrenched position near Jackson, on the 28th of that month; after which it proceeded to Winston and embarked for Portsmouth, Va. About this time the 7th Corps was discontinued and the battery was sent to Yorktown in October to form part of General Wistar's command, which in the reorganization of April, 1864, passed into the 2d Division of the 18th Corps, the Battery becoming part of the artillery brigade of its division. A few weeks after, all the batteries of the corps were formed into a brigade of corps artillery.

The Battery moved to Bermuda Hundred with Butler's forces and under General Heckman, was engaged at Valley Farm, May 6, 1864, and at Walthall Junction the following day. It fought within two miles of Petersburg, May 10th, at Proctor's Creek May 13th, and on the following day was engaged for five hours against an entrenched battery. When Grant detached four divisions from the Tenth and Eighteenth Corps at Bermuda Hundred, the latter part of May, 1864, and brought them around by steamer to White House to operate with the Army of the Potomac, L Battery accompanied Heckman's division. While engaged in this movement Lieut. J. S. Hunt (who had relieved Captain R. V. W. Howard of command of the battery the previous September) fell from the steamer the night of May 28th and was drowned. Lieut. H. B. Beecher then took command of the Battery and retained it until the close of the War. The Battery participated in the fighting at Gaines' Farm June 1st, when an attempt was made to force the passage of the Chickahominy, and two days later fought in the battle of Cold Harbor, where Lieut. S. L. Hubbard (2d Mass. Vols. attached) was wounded and 5 men and 14 horses were killed and wounded.

After serving on picket duty on alternate days from the 5th to the 12th of June, it returned to the Army of the James and was engaged in the siege of Petersburg from June 17th until August 28th, in which Lieutenant Beecher and the Battery were highly distinguished. It was in the trenches from the 22d to the 30th of June, from the 1st to the 11th of August (when it was partially engaged day and night), and again from the 14th to the 27th of the same month—during which operations it suffered some loss in both men and horses. August 28th it crossed the Chickahominy, moved to Hatcher's Run, went immediately on picket duty, and was engaged in the trenches before Richmond until the 5th of the following February, when it was relieved from its position and moved to Signal Hill. When the Twenty-fourth Corps was organized the previous December from troops of the Tenth and Eighteenth Corps, the Battery became part of the artillery brigade of that corps and served with it in the operations around Richmond.

BATTERY M.—The story of M Battery in the Civil War, until after the Battle of Stone River, has already been told in the sketch of H Battery.

Batteries H and M were separated immediately after that battle, M Battery retaining the four 3-in. guns, and at the same time increasing its armament by the addition of two 24-pdr. howitzers. It still remained with Grose's Brigade, which became the Third Brigade of the Second Division of the Twenty-first Corps on the 9th of January, 1863. Moving with its brigade the battery experienced all the discomforts of the Tullahoma campaign; and after that, at the battle of Chickamauga September 19 and 20, 1863, under Lieut. F. D. L. Russell, it fought in a distinguished manner, losing 8 men and 13 horses killed and wounded. When the Fourth Corps was recreated September 28, 1863, the Battery passed into it with Palmer's Division and became part of the Artillery Brigade of the First Division of the Fourth Corps. It remained at Chattanooga until November, and was then sent with the First (Cruff's) Brigade to guard the railroad bridge at Bridgeport, Alabama. By the following March it had become so reduced in horses that it was dismounted (turning in its guns and horses at Blue Springs, Tenn., March 19, 1864) and sent back to Nashville to refit. It there received four 12-pdr. guns March 30th, and the necessary horses in May, and again became a light battery. In June it marched to Decatur; but soon after returning to Nashville by rail, it was assigned to the First Division of the Reserve Artillery of the Army of the Cumberland. In October its enlisted strength was increased by the transfer to it of the privates of F Battery of the regiment.

Half of the battery was attached to Croxton's Brigade of Cavalry in October to operate along the Tennessee River, and was severely engaged near Pulaski October 22d, again on October 29th, when Croxton was driven back by Hood, and at Shoal Creek November 4th. The half batteries were reunited at Columbia the latter part of November. The battery was now attached to the artillery brigade of the Fourth Corps, and in Schofield's operations in that vicinity it was placed in position on several occasions. It was heavily engaged at the battle of Franklin November 30th, losing 9 men and a number of horses.

It fought in the battle of Nashville December 15th and 16th, and after-

wards accompanied the artillery brigade in pursuit of the enemy. It then went into winter quarters at Pulaski, where it remained until the latter part of January, 1865. Then proceeding to Huntsville it turned in its horses and moved to Bridgeport with its guns, where it took station in Fort Number One as part of the post artillery.

The following June while at Chattanooga it was mounted as a horse battery, but the War was over and it was soon after permanently dismounted.

Almost all of the field officers and captains, and some of the lieutenants were detached from the regiment and given higher commands during the War, E. O. C. Ord, A. P. Howe, Gustavus A. DeRussy and John Gibbon winning fame as commanders of high rank; while Charles H. Morgan, on the general staff of the Second Corps, proved himself to be a man of the most distinguished military attainments combined with indomitable energy. Morgan was promoted major under the Act of 1866, giving an additional major to each regiment.

By the fall of 1865 most of the batteries had been dismounted and the regiment was again performing garrison duty. Headquarters were at Fort M'Henry with batteries at that post, Forts Delaware, Washington, Foote, Monroe, Whipple, and in Washington City.

D Battery had been sent with its corps to Texas, but returned North and took station at Washington in February, 1866. B and K Batteries having made the most brilliant records in the War, were recommended by the colonel of the regiment to be retained as the two light batteries of the regiment. But the captain and one or more lieutenants of K being absent on detached service, this recommendation was not approved at the War Department in regard to that battery, and G, which had been one of the mounted batteries before the War, was retained as a light battery in its stead.

Light Battery B was sent to Leavenworth and G took station at Detroit.

The organization of a light battery under Orders No. 151, Series 1865, was 74 privates, 73 horses, 56 sabres (the drivers not being armed), and 8 revolvers for chiefs of pieces and caissons. One battery of each regiment was to be armed with 4 3-in. rifles and the other with 4 12-pdr. Napoleon guns.

The regiment retained its stations until November, 1872, the batteries occasionally interchanging, and a number of them doing reconstruction duty in North Carolina from 1870-72. G Battery was dismounted in February, 1869, under the order allowing but one light battery to each regiment, and was sent to North Carolina for duty in that section.

Light Battery B was in the field against the Cheyenne Indians in 1867, and in the campaign against the Indians in 1870, and joined at regimental headquarters in 1871.

When the regiment exchanged with the 2d Artillery in the fall of 1872, headquarters were established at the Presidio of San Francisco with batteries at the various posts in the harbor, two at the mouth of the Columbia River, and two at Sitka, Alaska.

The batteries at the mouth of the river and in Alaska were changed every two years, D, E, F, G, H, K and M serving at the mouth of the river

and A, C, D, F, G, L and a detachment of M in Alaska during tour of the regiment on the Pacific Coast. The Modoc War called a number of the batteries into the field a few weeks after their arrival on the Pacific Coast, A, B, E, G, K and M participating in that campaign which proved so disastrous to the regiment and the Army.

B Battery, mounted on the battery horses, acted as cavalry, while A, E, K and M formed part of Green's command on the south side of Tule Lake.

When the movement was made, in the middle of April, 1873, to close in on the Indians occupying the stronghold in the lava beds A Battery used the Coehorn mortars, while E, K and M acted as infantry; and all four were handsomely engaged in the fighting that occurred on April 15th, 16th and 17th, suffering a loss of ten men killed and wounded; and a detachment of M Battery was engaged April 20th, with the loss of one man. On April 26th occurred the unfortunate affair in which, after desperate fighting, Capt. Evan Thomas and Lieuts. Albion Howe, Arthur Cranston and George M. Harris were killed and twenty-one men of the regiment were killed and wounded. B Battery was in reserve in the fight at Sorass Lake May 10th, and turning in its horses the following day went into the lava beds to the stronghold. Then remounting on the 17th, it started with Green's Battalion in pursuit of the fleeing Indians, had a fight with the Cottonwood Band near Fairchild's ranch, and surprised Captain Jack at Willow Creek. The pursuit was continued the following day, during which a number of Indians were captured.

In the campaign of 1876 against the Sioux Indians, Batteries C, F, H and K formed a battalion under Capt. J. B. Campbell of F Battery.

They left their stations in August, 1876, and did not return until the following January. The battalion reported to General Mackenzie at Camp Robinson, encamped at Red Cloud Indian Agency, and was kept under arms when Mackenzie disarmed the Agency Sioux. When Crook organized his Powder River Expedition in November, the Battalion of the Fourth Artillery formed a part of Col. Richard I. Dodge's command; and during the subsequent operations the discomforts of a winter campaign were fully experienced, the thermometer on one occasion falling to forty degrees below zero.

January 10, 1877, General Brooks was retired and Joseph C. Roberts became the colonel of the regiment. He had entered the regiment as a brevet second lieutenant in 1835, and had risen through the various grades without ever having been out of it. General Roberts was retired July 2, 1877, and William H. French became colonel.

The Nez Percés, under Chief Joseph, broke out in hostilities in June, 1877, and the Fourth Artillery was again called on for field service, A, B, C, D, E, G, L and M Batteries going into the field. E Battery was with Howard at the crossing of the Salmon River, where the Indians were driven back after a brisk skirmish on the afternoon of June 28th. A, D, G and M Batteries joined Howard the next day. Following the Indians, the column next struck them at the Clearwater July 11th, and at one o'clock that afternoon Lieut. H. G. Otis of E Battery was at work against them with his howitzer. The fighting was very heavy, and in the spirited countercharge

against the enemy at 3.30 that afternoon A and E Batteries participated, Capt. E. A. Bancroft of A receiving a bullet through the lungs about this time.

A little later in the day Captain M. P. Miller, of E, led a second charge near the centre, which gained the ridge in front. At daylight the following day, in order to get possession of the spring, Captains Miller (Battery E) and Perry (1st Cav.), with Otis' howitzer, supported by Rodney's (D) Battery, were sent to secure it.

That afternoon Miller's battalion of the regiment (A, D, E, G and M batteries) made a handsome charge, which, after stubborn resistance, broke the enemy's lines. In this fight A Battery lost one officer and five men; E Battery, five men, and G Battery one man, killed and wounded. Just as the Indians were crossing the river the following day the troops came up with them, and some firing ensued.

C and L Batteries were sent from San Francisco, and joined Miller's battalion on the 26th of July. Organizing a column, consisting of Batteries A, C, D, E, G, L and M of the 4th Artillery, the 21st Infantry and the 1st Cavalry, Howard pushed on over the "Lolo Trail," constantly pressing the Indians, who were finally captured by General Miles. The battalion was not again engaged after crossing the Clearwater, but September 12th Lieutenant Otis, with his men in charge of the howitzer, was sent forward with Sturgis' command, and was engaged September 13th in the fight at Canyon Creek. In October the battalion came down the Missouri River by steam-boat to Omaha, and from there the batteries returned to their stations by rail. B Battery, equipped as cavalry, had proceeded by rail to Winnemucca, and marched from there to Fayette Lake, Idaho, but was recalled to San Francisco on account of the labor riots which occurred that summer. This cause in the east had taken I Battery from Fortress Monroe to assist in their suppression, and it served at Baltimore, Pittsburg and Cumberland during the troubles. In July, 1878, headquarters were sent to Angel Island, and most of the batteries were ordered into the field against the Bannock Indians. A, B, D, E, the greater part of F, G, H, K and M serving in that campaign. B was equipped as cavalry, and D and G mounted at Grande Ronde Valley the latter part of July formed part of Miles' battalion of mounted riflemen. D and G Batteries were engaged against the Piute Indians at Umatilla Agency, July 13th; and July 31st, Private J. H. Fisher, with three other privates of B Battery, had a handsome little fight with a party of Bannock Indians at Perry Munday's Ferry, and succeeded in defending the station and rescuing the mail stage, the driver of which had been badly wounded.

Regimental headquarters returned to the Presidio in March, 1880. General French retired July 1st of that year, and was succeeded by Emory Upton, whose sad death on March 15, 1881, made John M. Brannan colonel of the regiment.

In October, 1881, C, H and L Batteries were sent to Arizona to take part in the "Apache campaign," but were recalled a few weeks after their arrival, as the regiment was ordered east to take the stations of the 1st Artillery on the New England coast. The following extract from a tele-

gram to the Adjutant-General of the Army from the Headquarters of the Division of the Pacific is indicative of the esteem in which the regiment was held:

PRESIDIO OF SAN FRANCISCO, November 20th.

To the Adjutant General,
Washington, D. C.

* * * * *

In the absence of the Division Commander I say, what I am sure he would have me say for him upon the departure of this regiment, that it has, while in this Division, added to its already splendid reputation, by soldierly efficiency in the field in four campaigns, by continuous exemplary conduct in garrison, and especially by the conspicuous attainments and affability of its officers.

KELTON, A. A. G.

The record of the regiment in the campaigns against the Indians was an excellent one, and while all did well Captain Marcus P. Miller, of E Battery, made a most distinguished reputation.

The regiment remained on the New England coast, with headquarters at Fort Adams, R. I., until May, 1889, when it was sent to the southern stations with headquarters and four batteries at Atlanta, Georgia; two batteries at Saint Augustine, Florida; two at Barrancas, and one at New Orleans, La. Light Battery B still remains at Fort Adams, and Light Battery F (mounted August 15, 1882), after serving at Fort Snelling, Minn., from the fall of 1882 until May, 1889, is now at Fort Riley, Kansas.

When General Brannan was retired April 19, 1882, Albion P. Howe succeeded to the colonelcy. He was retired June 30, 1882, and Gustavus A. DeRussy was made colonel of the regiment. This officer transferred with General George W. Getty, colonel of the Third Artillery, July 17, 1882. Generals Brannan, DeRussy and Getty never assumed command of the regiment. Getty, commanding the Artillery School at Fortress Monroe, was retired October 2, 1883, and Clermont L. Best, was promoted colonel of the Fourth Artillery. He took command of the regiment and retained it until retired April 25, 1888, when Henry W. Clossen was promoted to the colonelcy.

NOTE.—See next page.

Memorandum.

A COMPLETE Roster of the
Fourth Regiment of Artillery
will follow the foregoing sketch when
the series of Historical Sketches ap-
pears in book form.—[EDS.]